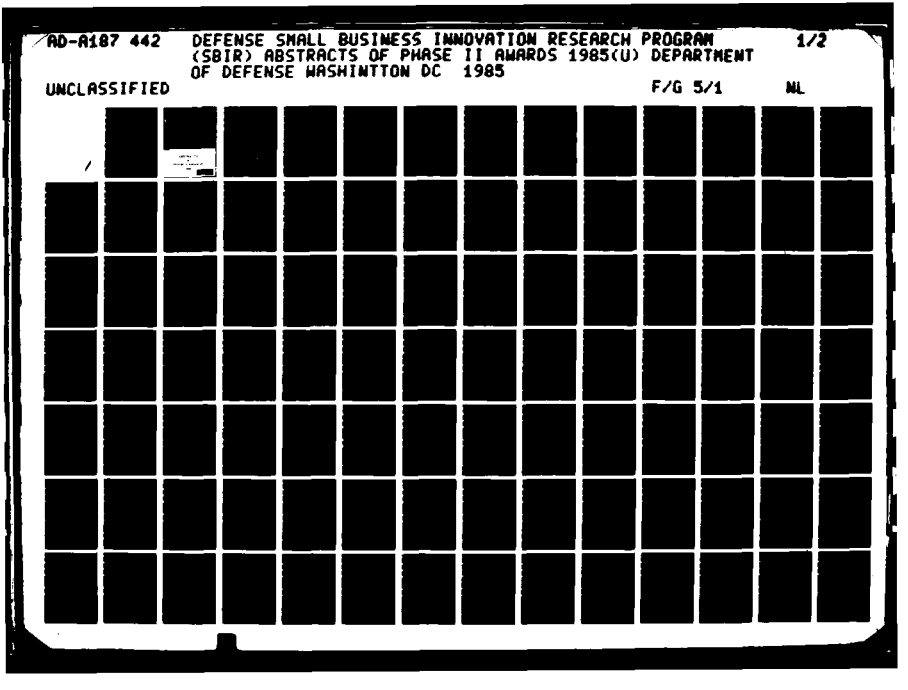
AD-A187 442 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM 1/2
(SBIR) ABSTRACTS OF PHASE II AWARDS 1985(U) DEPARTMENT
OF DEFENSE WASHINTTON DC 1985
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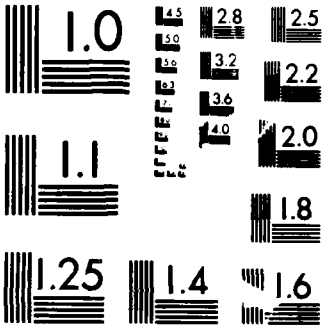

The Department of Defense

DoD Departments/Agencies:

Department of the Army

Department of the Navy

Department of the Air Force

DARPA — Defense Advanced Research Projects Agency

Defense Nuclear Agency

Strategic Defense Initiative Organization

DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

PREFACE

During Fiscal Year (FY) 1986 and FY 1987 the Military Services, the Defense Advanced Research Project Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) selected 260 proposals for funding in Phase II of the Small Business Innovation Research (SBIR) Program. These proposals were selected from those submitted by small research and development (R&D) firms awarded Phase I contracts from the FY 1985 solicitation.

In order to make information available on the technical content of the Phase II projects supported by the Department of Defense SBIR Program, this report presents the abstracts of those proposals which have resulted in contract awards. Further, the name and address of each firm performing the work is given for those who may desire additional information about the project.

Venture capital and large industrial firms that may have an interest in the research described in the abstracts in this publication are encouraged to contact the SBIR firm whose name and address are shown.

INTRODUCTION

On July 22, 1982 the President signed the "Small Business Innovation Development Act of 1982" (Public Law 97-219). This law, effective October 1, 1982, is designed to give small high technology firms a greater share of Federal R&D contract awards.

The Act mandates that all Federal Agencies establish an SBIR program if their FY 1982 extramural budgets for R&D exceeded a threshold figure of $100 million. (There are eleven government agencies meeting this requirement.) Beginning in FY 1983, DoD must make available the following percentages of its extramural R&D budget for this program:

	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Percentage (Statutory)	0.1	0.3	0.5	1.0	1.25	1.25
Estimated Dollars	16.7M	43M	79M	160M	204M	206M
Actual Awarded Dollars	20.6M	44.6M	78.2M*	150.7M*		

*On January 16, 1986 there was a 5.039 percent deferral or reduction on the FY 1985 and FY 1986 unobligated funds of all programs, program elements, projects, and activities based on the Gramm/Rudman/Hollings Bill. The DoD SBIR budget for FY 1985 was reduced by $1.8 million and by $5.622 million for 1986: OMB Bulletin 86-7, Jan 16, 1986.

Objectives:

Objectives of the DoD SBIR Program include stimulating technological innovation in the private sector, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research or research and development results.

The SBIR Program consists of three distinct phases. Under Phase I, DoD Components make awards to small businesses, typically of one half to one man-year effort over a period generally not to exceed six months, subject to negotiation. Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas or concepts submitted in response to SBIR topics. All DoD topics address specific R&D needs to improve our defense posture. Proposals selected for contract award are those which contain an approach or idea that holds promise to provide an answer to the specific problem addressed in the topic. The successful completion of Phase I is a prerequisite for further DoD support in Phase II.

Phase II awards will be made only to firms on the basis of results from the Phase I effort, and the scientific and technical merit of the Phase II proposal. In addition, proposals which identify a follow-on Phase III funding commitment from non-Federal sources will be given special consideration. Phase II

awards will typically cover two to five man-years of effort over a period generally not to exceed 24 months, also subject to negotiation. The number of Phase II awards will depend upon the success rate of the Phase I effort and the availability of funds. Phase II is the principal research or research and development effort, and will require a more comprehensive proposal which outlines the intended effort in detail.

Phase III is expected to involve private-sector investment and support for any necessary development that will bring an innovation to the marketplace. Also, under Phase III, DoD may award follow-on contracts not funded by the SBIR Program for products or processes meeting DoD mission needs.

FY 1985 Program

The SBIR solicitation of Phase I proposals for FY 1985 began with the selection of 491 research and development topic descriptions of need by the Military Services, DARPA, and DNA. The topics were consolidated into a single DoD solicitation brochure which was distributed on October 1, 1984 and closed on January 31, 1985. Also for FY 1985 the SDIO had 18 topics in a supplemental DoD solicitation, released on January 1, 1985 with a closing date of March 31, 1985.

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	111	808	124	64
Navy	138	851	110	55
Air Force	218	1306	249	118
DARPA	17	130	14	6
DNA	7	95	18	2
SDIO	18	415	36	15
	509	3605	551	260

Presentation of the technical abstracts which describe the nature of the funded FY 1985 Phase II SBIR projects is the main purpose of this report. Proprietary information is not provided in these abstracts, therefore, technical details may be missing. For this reason, the report supplies the names of individuals in the small business firms who may be contacted should more information be needed on a specific project.

Future Directions of SBIR Program

Public Law 99-443, the "Small Business Innovation Act of 1986" was signed by the President on October 6, 1986. This law reauthorized P.L. 97-219 to extend the sunset clause to 1993; to continue 1.25 percent taxation of the extramural research and development budget; and to exclude from taxation amounts of the DoD research and development budget obligated solely for operational systems development.

SUBMITTED BY DEPT

ABIOMED ARMY
33 CHERRY HILL DR
DANVERS, MA 01923
DR ROBERT T V KING
TITLE:
RAMAN CONVERTED MID-IR-LASER
TOPIC: 45 OFFICE: CECOM/NVEO

NO ABSTRACT FOR ABIOMED

ADAPTIVE MACHINE TECHNOLOGIES INC DARPA
1224 KINNEAR RD - STE 130
COLUMBUS, OH 43212
VINCENT J VOHNOUT
TITLE:
THE DEVELOPMENT AND TESTING OF A HIGH PERFORMANCE MANIP
TOPIC: 4 OFFICE: DARPA

A HIGH PERFORMANCE MANIPULATOR IS PROPOSED WHICH USES ADVANCED DESIGN CONCEPTS AND CONTROL TECHNIQUE TO ACHIEVE PERFORMANCE FAR SUPERIOR TO THAT OF CONVENTIONAL MANIPULATORS. THE COMPLETED PHASE I DESIGN STUDIES INDICATE THAT A MANIPULATOR CAN BE DEVELOPED WITH A USEFUL LOAD CAPACITY OF 100 KILOGRAMS, A USEFUL REACH OF 2.5 METERS, A WORKING VOLUME OF 8.7 CUBIC METERS, AND END-EFFECTOR ACCELERATION OF 19.6 METERS PER SECOND SQUARED, AND END-EFFECTOR SPEED OF 5 METERS/ SECOND, AND A WEIGHT OF 397 KILOGRAMS. THE HIGH PERFORMANCE MANIPU-LATOR SYSTEM USES LIGHTWEIGHT STRUCTURE AND ENDPOINT FEEDBACK TO ACHIEVE HIGH PERFORMANCE. IT IS CONFIGURED FOR USE ON MOBILE SYSTEMS, WHERE ITS HIGH POWER TO WEIGHT RATIO AND GOOD ENERGY EFFICIENCY ARE OF CRITICAL IMPORTANCE. BECAUSE OF THE MODERATE LENGTH OF THE MANI-PULATOR (2.5 METERS), A REFERENCE ARM IS USED TO PROVIDE ENDPOINT FEEDBACK. HYBRID HYDRAULIC/HYDROSTATIC ACTUATION PROVIDES AMPLE POWER AND SPEED WITH GOOD ENERGY EFFIEICNEY. THE OBJECTIVE OF THE PHASE II EFFORT IS TO PERFORM THE DETAILED DESIGN, CONSTRUCTION, AND TESTING OF THE HIGH PERFORMANCE MANIPULATOR.

ADVANCED COMPOSITE PRODUCTS INC ARMY
37 WASHINGTON AVE
E HAVEN, CT 06512
DAVID MAASS
TITLE:
FULL SCALE DEVELOPMENT OF A TOUGH THERMOPLASTIC COMPOSI
BRIDGE DECK
TOPIC: 53 OFFICE: BRDC

THE OBJECTIVE OF THIS EFFORT IS TO FURTHER DEVELOP AND VERIFY THE

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STRUCTURAL DESIGN OF A THERMOPLASTIC COMPOSITE BRIDGE DECK INITIATED UNDER THE PHASE I PRELIMINARY DESIGN. CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES (TPC) ARE IDEALLY SUITED FOR THE TRI-ARCH BRIDGE DECK APPLICATION FOR A NUMBER OF REASONS. TPC'S OFFER SIGNIFICANT WEIGHT REDUCTION POTENTIAL, IMPROVED IMPACT DAMAGE TOLERANCE, REDUCED NOTCH SENSITIVITY, THE POTENTIAL FOR SIMPLE FIELD REPAIR, LOW COST-HIGH VOLUME MANUFACTURING METHODS, AND THE ELIMINATION OF CORROSION. IN THIS EFFORT, THE GRAPHITE/PPS (RYTON) HYBRID WOVEN TPC MATERIAL IS TO BE OPTIMIZED AND CHARACTERIZED WITH RESPECT TO ENVIRONMENTAL STATISTICAL EFFECTS. USING THESE PROPERTIES, TOGETHER WITH A MORE REFINED FINITE ELEMENT MODEL, THE COMPOSITE BRIDGE DECK DESIGN IS TO BE DETAILED, INCLUDING ALL ATTACHMENT FITTINGS. FULL DEPTH PANELS ARE TO BE FABRICATED. THESE PARTS ARE TO BE STRUCTURALLY TESTED FOR INITIAL LOAD CAPABILITY, TOLERANCE TO VEHICLE-IMPOSED DAMAGE, AND FOR RESIDUAL LOAD CAPABILITY AFTER A FIELD-LEVEL REPAIR OF TYPICAL DAMAGE HAS BEEN PERFORMED.

ADVANCED COMPOSITE PRODUCTS INC AF
37 WASHINGTON AVE
E HAVEN, CT 06512
DAVID MAASS
TITLE:
FULL SCALE DEVELOPMENT OF CONTINUOUS HEATED ROLL FORMIN
OF THERMOPLASTIC COMPOSITE MATERIALS
TOPIC: 7 OFFICE: ASD/TA

UNDER THIS PROGRAM, A HEATED ROLL FORMING (HRF) SYSTEM IS TO BE BUILT AND DEMONSTRATED SUITABLE FOR THE CONTINUOUS FORMING OF THERMOPLASTIC COMPOSITE FLIGHT HARDWARE. UNDER THE PRIOR PHASE I AWARD, FEASIBILITY OF THIS PROCESS WAS DEMONSTRATED FOR A VARIETY OF THERMOPLASTIC COMPOSITE MATERIALS WHICH ARE ACTIVELY BEING DEVELOPED FOR NEXT GENERATION (AIF) STRUCTURAL APPLICATIONS. THIS WORK IDENTIFIED SPECIFIC MACHINERY FEATURES AND RELATED PROCESS VARIABLES WHICH ARE REQUIRED FOR THE FABRICATION OF FLIGHT QUALITY HARDWARE. IN THE PRESENT PHASE II EFFORT, A SPECIFIC MACHINE IS TO BE DESIGNED AND ASSEMBLED INCORPORATING THESE FEATURES. THE INFLUENCE OF THESE PROCESS VARIABLES ARE TO BE DETERMINED IN A CAREFUL STUDY OF THESE EFFECTS. A SPECIFIC APPLICATION FOR A CURRENT AIR FORCE SYSTEM IS TO BE DEMONSTRATED UTILIZING THE HRF MACHINERY AND PROCESS. THUS, AT THE CONCLUSION OF THE PROGRAM, EQUIPMENT AND PROCESS EXPERTISE SHALL BE AVAILABLE FOR OTHER DOD OR COMMERCIAL APPLICATIONS.

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ADVANCED DECISION SYSTEMS ARMY
201 SAN ANTONIO CIRCLE - STE 286
MOUNTAIN VIEW, CA 94040
DANIEL G SHAPIRO
TITLE:
OPERATIONS MONITORING ASSISTANT (OMA) SYSTEM
TOPIC: 27 OFFICE: CECOM/ADP

THIS PROPOSAL PRESENTS A PRELIMINARY DESIGN OF A MIXED INITIATIVE OMA SYSTEM FOR CORPS LEVEL G3 OPERATIONS USE. THE SYSTEM IS DESIGNED TO AID IN MONITORING CORPS, SUBORDINATE AND SUPPORTING UNITS' OPERATIONS; SPECIFICALLY TO ALERT THE G3 WHEN REPORTED EVENTS AND STATUS INFORMATION INDICATE SIGNIFICANT DEVIATIONS FROM THE CURRENT PLAN, AND TO POINT OUR POTENTIAL OPPORTUNITIES OR RISK SITUATIONS THAT ARISE. A PLAN FOR DEVELOPING THE OMA SYSTEM THROUGH A CONCEPT FEASIBILITY DEMONSTRATION IS PROVIDED.

ADVANCED MARINE ENTERPRISES INC NAVY
1725 JEFFERSON DAVIS HWY - STE 1300
ARLINGTON, VA 22202
KARL FARBER
TITLE:
SPARE PART SERIAL TRACKING
TOPIC: 23 OFFICE: SPAWAR

*IT IS PROPOSED THAT A PLAN TO EVALUATE, SELECT, AND TEST (FOR ECONOMIC FEASIBILITY) AN ELECTRONIC SERIAL TRACKING SYSTEM BE DEVELOPED. MORE SPECIFICALLY, A MARKET SURVEY WILL BE CONDUCTED TO DETERMINE THE AVAILABLE ELECTRONIC TRACKING SYSTEMS. NEXT, THE CHARACTERISTICS AND PERFORMANCE OF EACH TRACKING SYSTEM WILL BE DOCUMENTED. THE LIKELY OPERATING ENVIRONMENTS OF THE TRACKING SYSTEM WILL THEN BE IDENTIFIED FROM WHICH CHARACTERISTICS AND MINIMUM PERFORMANCE REQUIREMENT OF THE TRACKING SYSTEM MAY BE OBTAINED. THOSE TRACKING SYSTEMS FAILING TO MEET THE PERFORMANCE REQUIREMENTS IDENTIFIED THROUGH CONSIDERATION OF OPERATING ENVIRONMENTS WILL BE REMOVED FROM FURTHER CONSIDERATION. OF THE REMAINING SYSTEMS, ONE WILL BE CHOSEN BASED ON PERFORMANCE AND CAPABILITY, EASE OF OPERATION AND INTERFACING, AND COST. FROM THE SURVEY OF OPERATING ENVIRONMENTS, ONE OPERATING ENVIRONMENT MUST BE CHOSEN AS A REPRESENTATIVE TEST SYSTEM. A TEST PLAN WILL THEN BE DEVELOPED AND EVALUATION CRITERIA SPECIFIED. THE "PAPERLESS" INVENTORY SYSTEM RESULTING FROM ELECTRONIC TRACKING WILL PROVIDE FOR THE RAPID AND ACCURATE IDENTIFICATION, LOCATION, AND CHARACTERIZATION OF MILITARY HARDWARE. IN TIME, A DATA BASE SUF-

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FICIENT TO SOLVE PROBLEMS CONCERNING RELIABILITY AND MAINTAINABILITY CAN BE CONSTRUCTED.

ADVANCED RSCH & APPLICATION CORP(ARACOR) SDIO
1223 E ARQUES AVE
SUNNYVALE, CA 94086
LOUIS N KOPPEL
TITLE:
X-RAY SOURCE ENHANCEMENT FOR X-RAY LASER (XRL) MATERIAL REPONSE EXPERIMENTATION
TOPIC: 3 OFFICE: IST

NO ABSTRACT FOR ADVANCED RSCH & APPLICATION CORP(ARACOR)

ADVANCED SYSTEM TECHNOLOGIES INC NAVY
3801 E FLORIDA AVE - STE 400
DENVER, CO 80210
DR ROBERT T GOETTGE
TITLE:
EXPERT ASSISTANT FOR PERFORMANCE ENGINEERING OF LARGE EMBEDDED REAL-TIME SOFTWARE
TOPIC: 82 OFFICE: NSWC/DL

*LARGE, EMBEDDED REAL-TIME SOFTWARE DEVELOPMENTS OFTEN LACK PERFORMANCE ENGINEERING EXPERTISE DUE TO A SHORTAGE OF PERFORMANCE EXPERTS. EXPERT SYSTEM TECHNOLOGY OFFERS A SOLUTION TO THE SHORTAGE OF PERFORMANCE ENGINEERING EXPERTS. TWO TECHNICAL OBJECTIVES MUST BE RESEARCHED BEFORE AN EXPERT SYSTEM BASED ASSISTANT FOR PERFORMANCE ENGINEERING CAN BE DEVELOPED: (1) DEFINITION OF A BODY OF UNDERLYING EXPERTISE IN PERFORMANCE ENGINEERING OF LARGE, EMBEDDED REAL-TIME SOFTWARE, AND (2) DEMONSTRATION THAT THIS EXPERTISE IS AMENABLE TO EXISTING EXPERT SYSTEM TECHNOLOGY. THE PROPOSED PHASE I RESEARCH OF THIS SBIR PROJECT WILL ADDRESS THESE TECHNICAL OBJECTIVES BY DEVELOPING A KNOWLEDGE BASE FOR AN EXPERT SYSTEM FOR DESIGN EVALUATION, A CRITICAL COMPONENT OF PERFORMANCE ENGINEERING. BY DEVELOPING A KNOWLEDGE BASE THE TECHNICAL OBJECTIVES WILL BE NATURALLY ANSWERED. IN ADDITION, THE KNOWLEDGE BASE WILL SERVE AS FOUNDATION FOR EXPLORATORY DEVELOPMENT IN PHASE II.

AIR TURBINE TECHNOLOGY INC NAVY
6001 PARK OF COMMERCE BLVD
BOCA RATON, FL 33431
MICHAEL J DEBRECENI
TITLE:
HIGH SPEED TURBINE DEVELOPMENT
TOPIC: 114 OFFICE: NWC/NAVSEA

*A PHASE I PROGRAM WILL BE DIRECTED TOWARD THE DEVELOPMENT OF A HIGH-

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SPEED, POWER GENERATING TURBINE DRIVEN BY A COMPRESSED FLUID. CONCEPTS AND DETAILS WILL BE FORMULATED, DESIGNED, AND ANALYZED WITH REGARDS TO EFFICIENCY, LIGHT WEIGHT, COST EFFECTIVENESS, OPERATING CHARACTERISTICS, AND RELIABILITY. OVERALL SIZE WILL BE 2 INCHES DIAMETER OR LESS. ROTOR/NOZZLE CONFIGURATIONS WILL BE ANALYZED AND EVALUATED IN CONJUNCTION WITH OPERATING PARAMETERS (3 HP DEVELOPED, 250 KRPM, AND MINIMUM EFFICIENCY OF 40%), FLUIDS, PRESSURES, AND TEMPERATURES UP TO 2500 F. BEARINGS AND SEALS WILL BE EVALUATED AND SELECTIONS MADE. VARIOUS MATERIALS WILL BE REVIEWED AND SELECTED BASED UPON OPERATING STRESSES, FLUID COMPATIBILITY, AND TEMPERATURE LIMITS COMMENSURATE WITH LIGHT WEIGHT, RESONABLE COST, AVAILABILITY, AND MANUFACTURING EASE. DYNAMIC STABILITY WITH REGARDS TO SHAFT, ROTOR, AND SUPPORTS WILL BE ANALYZED AS WELL AS DAMPING, BEARING PRELOAD, AND LUBRICATION TECHNIQUES. COMPUTER PROGRAMS WILL BE USED TO PREDICT TURBINE PERFORMANCE, DYNAMIC BALANCE, AND STRESS ANALYSES TO ASSIST IN ESTABLISHING THE TURBINE'S CONFIGURATION. INTERFACE REQUIREMENTS INCLUDING MOUNTING AND SHAFT COUPLING METHODS WILL BE INVESTIGATED AND SELECTED IN LIGHT OF POTENTIAL USER REQUIREMENTS AND TO INSURE VERSATILITY AND COMPATIBILITY. A TURBINE WHEEL (ROTOR) WILL ALSO BE FABRICATED.

AKM ASSOCS ARMY
30 W POINT PL
SAN MATEO, CA 94402
DR ASOK K MUKHOPADHYAY
TITLE:
ARTIFICIAL INTELLIGENCE (AI) - ROBOTICS: AI-BASED FIRE CONTROL DESIGN AIDS
TOPIC: 13 OFFICE: ARDC

NO ABSTRACT FOR AKM ASSOCS

AKM ASSOCS AF
30 WEST POINT PL
SAN MATEO, CA 94402
CARL PONDER
TITLE:
HIGH PERFORMANCE ADA ENGINE (HARDWARE/SOFTWARE) IMPLEME
TOPIC: 23 OFFICE: AFWAL/AA

FUTURE EMBEDDED SYSTEMS MAY NEED TO PERFORM A LARGE NUMBER OF TASKS SIMULTANEOUSLY, BE ABLE TO USE A LARGE AMOUNT OF INPUT DATA, AND PER-

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FORM NON-TRIVIAL COMPUTATIONS AND DECISION-PROCEDURES. PERFORMANCE TURNAROUND TIME WILL BE AN IMPORTANT CONSIDERATION IN SITUATIONS WHEN DECISIONS MUST BE MADE IN A SHORT PERIOD OF TIME. CERTAIN REPEATED TASKS, SUCH AS MONITORING SERVICES, MAY NEED TO BE PERFORMED OVER SHORT INTERVALS. TIMING DELAYS MUST NOT BE EXCESSIVE. THE PURPOSE OF THIS PROPOSAL IS TO EXPLORE OPTIMIZATIONS IN HARDWARE DESIGN AND PROGRAM/OPERATING SYSTEM INTERFACE IN ORDER TO IMPROVE THE PERFORMANCE OF EMBEDDED SYSTEMS. A HIGH PERFORMANCE SYSTEM FOR EXECUTING ADA WILL BE CONSTRUCTED, UTILIZING STATE-OF-THE-ART DEVELOPMENTS IN REDUCED-INSTRUCTION-SET (RISC) MICROPROCESSORS, COMPILER OPTIMIZATION, AND RUNTIME-SUPPORT SYSTEMS. RISC PROCESSORS ARE CIRCUMVENTING MANY OF THE LIMITATIONS INHERENT IN THE UNWIELDLY COMPLEX-INSTRUCTION SET PROCESSORS SUCH AS THE VAX AND INTEL iAPX 4/32. HOWEVER, TO UTILIZE THESE EFFECTIVELY REQUIRES EFFORT IN COMPILING, PARTICULARLY IN THE CODE OPTIMIZATION AND RUNTIME-SYSTEM ORGANIZATION. HENCE, THE EFFORT MUST BALANCE BETWEEN THE HARDWARE DESIGN AND SOFTWARE DEVELOPMENT. THE PRIMARY OBJECTIVE IS TO DESIGN A .40 ns CYCLE-TIME CMOS MICROPROCESSOR (25-MIP PEAK) WITH A HIGHLY-OPTIMIZING ADA COMPILER CAPABLE OF MAKING NEARLY FULL USE OF AVAILABLE PERFORMANCE. THE PROCESSOR WILL FEATURE A FOUR-STAGE PIPELINE, DEFERRED REGISTER-WRITES, DEFERRED JUMPS, AND A LARGE BANK OF REGISTERS. COMPILER OPTIMIZATION ON BOTH THE LOCAL AND GLOBAL LEVELS WILL BE NECESSARY TO MAXIMIZE PIPELINE UTILIZATION.

ALBANY TITANIUM INC AF
PO BOX 887 - 840 30TH ST SW
ALBANY, OR 97321
DR JOSEPH A MEGY
TITLE:
PRODUCTION OF TITANIUM ALUMINIDES BY THE AlTi-OXY PROCE
TOPIC: 9 OFFICE: ASD/TA

TITIANIUM ALUMINIDE ALLOYS (TiAl AND Ti3Al), INCLUDING TiXAl WITH NIOBIUM (Nb) AND ERBIUM (Er) DIPERSOIDS, WERE SUCCESSFULLY PRODUCED IN A PHASE I SBIR PROGRAM USING THE AlTi-OXY PROCESS. PHASE II WORK WILL INCLUDE PRODUCTION OF SMALL LOTS FOR METALLURGICAL AND CHEMICAL PROPERTY CHARACTERIZATION FOLLOWED BY PRODUCTION AND TESTING OF LARGE LOTS IN PREPARATION FOR COMMERCIALIZATION.

AMERASIA TECHNOLOGY INC AF
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR TEONG C LIM
TITLE:
DEVELOPMENT OF SURFACE ACOUSTIC WAVE CHIRP TRANSFORM CORRELATOR FOR SCORING RECEIVER
TOPIC: 181 OFFICE: AD/YIS

THIS PROPOSAL ADDRESSES THE NEED FOR REAL TIME ANALYSIS OF ECM

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EQUIPMENT IN RESPONSE TO THREAT EMISSIONS. THREAT SIMULATORS WILL BENEFIT BY USING SURFACE ACOUSTIC WAVE (SAW) DISPERSIVELY DELAY LINE (DDL) DEVICES TO PERFORM REAL TIME FOURIER ANALYSIS. IN EFFECT THE SYSTEM FUNCTIONS AS A REAL TIME "SCORING RECEIVER". AN ADAPTIVE RESPONSE BY THE THREAT EMITTER BASED UPON REAL TIME INFORMATION WILL ENHANCE THE EFFECTIVENESS AND REALISM OF TRAINING MISSIONS. DURING PHASE I A FEASIBILITY STUDY AIMED AT IMPLEMENTING A SCORING RECEIVER USING STATE-OF-THE-ART SAW DISPERSIVE FILTERS WAS PERFORMED. PHASE I STUDIES HAVE SHOWN THAT THE SAW CHIRP TRANSFORM METHOD IS A FEASIBLE APPROACH FOR IMPLEMENTING A REAL TIME SCORING RECEIVER. THE PROPOSED PHASE II PROGRAM IS TO DEVELOP A LOW COST SCORING RECEIVER FOR REAL TIME FOURIER ANALYSIS OF AIRCRAFT TRANSMISSIONS. THE SUCCESSFUL DEMONSTRATION OF A SCORING RECEIVER SYSTEM WILL LEAD TO THE INCORPORATION OF SCORING RECEIVERS IN THREAT EMITTERS CURRENTLY IN USE BY THE AIR FORCE.

AMERASIA TECHNOLOGY INC ARMY
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
LIBRATIONAL SURFACE ACOUSTIC WAVE (SAW) GYRO DEVELOPMEN
TOPIC: 2 OFFICE: ARDC

THERE IS A NEED FOR A LOW COST, LIGHT WEIGHT AND HIGH PERFORMANCE ROLL RATE SENSOR FOR WHICH LARGE NUMBERS OF THESE SENSORS ARE REQUIRED TO REPLACE THE PRESENT COMPRESSED AIR SPIN-UP GYROS. IN THIS PROPOSAL, A LIBRATIONAL GYRO UTILIZING SURFACE ACOUSTIC WAVE (SAW) SENSOR IS PROPOSED. PHASE I STUDIES INDICATED THAT SUCH LIBRATIONAL SAW GYRO COULD MEET THE SPECIFICATION OF ARMY ROLL RATE SENSOR FOR THE PROJECTILE APPLICATION WITH NO MOVING PART, LIGHTER WEIGHT, SMALLER SIZE, BETTER PERFORMANCE AND POTENTIALLY LOWER COST THAN THE PRESENT GYRO. THE OBJECTIVE OF THE PHASE II EFFORT IS TO DESIGN, FABRICATE, TEST AND DELIVER ENGINEERING MODELS TO THE ARMY FOR FURTHER EVALUATION.

AMERASIA TECHNOLOGY INC NAVY
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
SURFACE ACOUSTIC WAVE (SAW) MINE SENSORS DEVELOPMENT
TOPIC: 106 OFFICE: NSWC

*A DIGITAL UNDERWATER SOUND DETECTION SYSTEM FOR SMART MINES USING SAW

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RESONATOR BASED SENSORS IS PROPOSED. THE ADVANTAGES ARE LARGE DYNAMIC RANGE, SENSITIVITY MINUS 180 db RE 1 V/mPa, 16 PLUS BIT ACCURACY, SMALL SIZE AND LOW COST, AND A DIGITAL OUTPUT WITHOUT ANALOG-TO-DIGITAL CONVERTERS. THESE ADVANTAGES ENABLE THE SAW SENSOR TO MEET ALL OF THE REQUIREMENTS OF SMART MINE SENSORS. THE PROPOSED STUDY (PHASE I) WILL PROVIDE A DETAILED DESIGN OF SAW SENSOR FOR UNDERWATER SOUND DETECTION. A DIGITAL CMOS SPECTRUM ANALYZER WILL BE DESIGNED TO PROVIDE SIGNATURE ANALYSIS AND TARGET CHARACTERIZATION. A BASELINE SENSOR ARRAY SYSTEM WILL BE SIMULATED TO VERIFY SYTSTEM PERFORMANCE AND ANALYZE OPERATIONAL CHARACTERISTICS IN TERMS OF SMART MINE REQUIREMENTS. HARDWARE IMPLEMENTATION AND TESTING WILL BE PERFORMED IN PHASE II OF THE PROJECT.

AMERASIA TECHNOLOGY INC NAVY
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
SURFACE ACOUSTIC WAVE (SAW) RATE-OF-DESCENT/ALTITUDE TRANSDUCER DEVELOPMENT
TOPIC: 115 OFFICE: NAVAIR/NWC

*THE PROPOSED PROGRAM IS TO PERFORM STUDIES LEADING TO THE DEVELOPMENT OF A SURFACE ACOUSTIC WAVE (SAW) TRANSDUCER FOR ON BOARD AIR-DATA SYSTEM. THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEVELOP A HIGH PERFORMANCE DIGITAL RATE-OF-DESCENT/ALTIMETER TRANSDUCER WHICH WILL UTILIZE STATE-OF-THE-ART SAW TECHNOLOGY. PRELIMINARY ANALYSIS SHOWS THAT SAW TRANSDUCER HAS: (1) A DYNAMIC RANGE OF 10 TO THE 6TH POWER, THUS GIVING AN ACCURACY OF LESS THAN 0.01 FT. IN 1000 FEET, (2) THE ALTITUDE QUANTIZATION RATE OF 0.5 FT/Hz, AND (3) AN EQUIVALENT SAMPLING RATE OF 60 KHz (APPROXIMATELY 2/16 BITS/SEC.)/

AMERICAN RESEARCH CORP OF VIRGINIA NAVY
642 FIRST ST
RADFORD, VA 24141
R C STIFFLER
TITLE:
CHARACTERIZATION OF DAMAGE IN COMPOSITE ROCKET MOTOR CA
TOPIC: 113 OFFICE: NWC

*THE INHERENT ANISTROPY AND INHOMOGENEITY OF COMPOSITE MATERIALS MAKE DAMAGE DETECTION AND CHARACTERIZATION DIFFERENT THAN THAT OF HOMO-

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GENEOUS ISOTROPIC MATERIALS. BOTH IN QUALITY ASSURANCE AND MAINTAINABILITY, TESTS BASED ON STRONG AND WELL UNDERSTOOD PRINCIPLES MUST BE ESTABLISHED IN ORDER TO DETECT AND QUANTIFY DAMAGE. THE DATA FROM THESE TESTS COULD SERVE AS A BASIS FOR ACCEPT-REJECT CRITERIAL FOR DAMAGE ROCKET MOTOR CANISTERS. TWO TECHNIQUES THAT APPEAR BEST SUITED FOR CHARACTERIZING DAMAGE ARE ULTRASONIC AND HIGH-FREQUENCY EDDY CURRENT METHODS. EDDY CURRENT TECHNIQUES ARE SENSITIVE TO DAMAGE NEAR THE SURFACE WHILE ULTRASONICS CAN PENETRATE THE THICKNESS OF THE ROCKET MOTOR CANISTER. THE OBJECT OF THIS RESEARCH PROGRAM INVOLVES THE DEVELOPMENT OF THE NECESSARY PRINCIPLES, TECHNIQUES, HARDWARE AND SOFTWARE TO CHARACTERIZE DAMAGE IN ROCKET MOTOR CASINGS.

AMHERST SYSTEMS INC AF
30 WILSON RD
BUFFALO, NY 14221
DR HOLLIS F RYAN
TITLE:
CEESIM/SUPPRESSOR IMPLEMENTATION
TOPIC: 10 OFFICE: ASD/XR

THIS 12 MONTH, PHASE II PROJECT WILL IMPLEMENT THE SUPPRESSOR ENGAGEMENT MODEL IN A MICROVAX II SYSTEM SUCH THAT APPROXIMATELY ONE HUNDRED PLAYERS CAN BE SIMULATED IN REALTIME. THIS SYSTEM WILL THEN BE INTEGRATED WITH THE COMBAT ELECTROMAGNETIC ENVIRONMENT SIMULATOR (CESSIM) WHICH PRODUCES THE ELECTROMAGENTIC ENVIRONMENT OF A DYNAMIC 1000 EMITTER COMBAT SCENARIO. THE INTEGRATION OF SUPPRESSOR WITH CESSIM WILL ENABLE THE EW SYSTEM UNDER TEST (SUT) TO "FLY" THROUGH THIS COMBAT SCENARIO WITH THE GROUND BASED EMITTERS, UNDER CONTROL OF SUPPRESSOR, REACTING TO THE PRESENCE OF THE SUT PLATFORM AS THEY WOULD IN A REAL COMBAT SITUATION. THE FLIGHT PATH OF THE SUT PLATFORM CAN BE UNDER ONLINE OPERATOR CONTROL. THE END PRODUCT OF THE PHASE II EFFORT WILL BE A PROTOTYPE OF A SIMULATOR SYSTEM THAT CAN PROVIDE MAN-IN-THE-LOOP EVALUATION OF EQUIPMENT AND TACTICS IN THE USE OF THAT EQUIPMENT. FOR THIS REASON, THE SYSTEM IS CALLED THE TACTICS AND EQUIPMENT EVALUATOR (TEEVAL).

AMPARO CORP AF
PO BOX 36780
ALBUQUERQUE, NM 87176
J J WALKER
TITLE:
HE DRIVEN LINAC FOR RADAR SUPPRESSION
TOPIC: 83 OFFICE: AFBMO/MYSC

THE WORK REPORTED HEREIN DESCRIBES A TECHNIQUE FOR GENERATING A

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HIGH-POWER PULSE OF MICROWAVES AND PRESENTS A DEVELOPMENT EFFORT FOR PRODUCING A PROTOTYPE SYSTEM TO BE USED IN PROOF OF CONCEPT EXPERIMENTS. THE TECHNIQUE EMPLOYS AN EXPLOSIVELY DRIVEN POWER SOURCE CAPABLE OF DELIVERING 10 TO THE 11 POWER WATTS OF POWER FOR A FEW MICROSECONDS. THIS POWER IS DELIVERED TO AN "AERIAL MECHANISM" MICROWAVE GENERATOR OPERATING AT RELATIVELY HIGH EFFICIENCIES--APPROXIMATELY 25%. FOR A FREQUENCY OF 30 GHZ THIS SYSTEM CAN PRODUCE FIELD STRENGTHS OF KILOVOLTS PER METER ON THE GROUND FROM AN INSTRUMENT LOCATED AT AN ALTITUDE OF 30 KILOMETERS.

ANALYSIS & MEASUREMENT SERVICES CORP AF
9111 CROSS PARK DR NW
KNOXVILLE, TN 37923
H M HASHEMIAN
TITLE:
DETERMINATION OF INSTALLED THERMOCOUPLE RESPONSE
TOPIC: 213 OFFICE: AEDC/DOT

THE FEASIBILITY OF A NEW TECHNOLOGY FOR IN-SITU RESPONSE TIME TESTING OF THERMOCOUPLES WAS DEMONSTRATED IN PHASE I. THEREFORE, A PHASE II RESEARCH AND DEVELOPMENT PROGRAM *IS PROPOSED* TO ELEVATE THE TECHNOLOGY TO ITS FULL POTENTIAL. THE PROGRAM INCLUDES LABORATORY TESTING OF TYPICAL THERMOCOUPLES AND INSTALLATION CONFIGURATIONS, DEVELOPMENT OF TWO PROTOTYPE TEST INSTRUMENTS, FIELD TESTING IN REALISTIC TEST SITUATIONS, SURVEY OF INDUSTRIAL NEEDS, AND DEVELOPMENT OF SENSOR DESIGNS WHICH OPTIMIZE RESPONSE TIME TESTING ACCURACY WITHOUT LOSS OF NORMAL MEASUREMENT CAPABILITY.

ANALYSIS & SIMULATION INC (ANSIM) AF
ONE AMERICAN DR (FORMALLY: XMCO INC)
BUFFALO, NY 14225
PAUL PATTI
TITLE:
INNOVATIVE TACTICS FOR AIR COMBAT SIMULATION
TOPIC: 36 OFFICE: AFWAL/FI

IN ITS PHASE I EFFORT XMCO DETERMINED THAT THERE IS A POTENTIAL FOR THE USE OF AI TECHNIQUES IN BUILDING A MORE REALISTIC TACTICS GENERATION MODULE ADAPTABLE TO EXISTING SIMULATION MODELS. FOR PHASE II, XMCO WILL PROCEED WITH DEVELOPMENT OF A TACTICS GENERATION MODULE USING RULE-BASED EXPERT SYSTEM TECHNIQUES IN A LISP LANGUAGE STRUCTURE. THE TACTICS GENERATION MODULE WILL BE WRITTEN TO BE OPERATIONAL

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WITHIN THE CALLING STRUCTURE OF AN EXISTING AIR COMBAT MODEL WHOSE SIMULATION ELEMENTS WILL BE RESTRUCTURED TO A LEVEL COMPATIBLE WITH THE REQUIREMENTS OF A MORE REALISTIC COMBAT ENVIRONMENT SIMULATION. COMPATIBILITY BETWEEN THE FORTRAN-BASED CORE MODEL AND TACTICS MODULE WRITTEN IN LISP WILL BE ACHIEVED THROUGH APPROPRIATE INTERFACE ROUTINES.

ANALYTICS INC NAVY
2500 MARYLAND RD
WILLOW GROVE, PA 19034
KEITH JOHNSON
TITLE:
COST PRODUCTION TECHNIQUE FOR SOFTWARE
TOPIC: 35 OFFICE: SPAWAR

*BY IDENTIFYING THE HEURISTICS USED BY EXPERT ESTIMATORS TO DRAW ANALOGIES AND MAKE INFERENCES FROM HISTORICAL DATA AND KNOWLEDGE OF THE DEVELOPMENT PROCESS, AND BY IDENTIFYING AND, TO THE EXTENT POSSIBLE, QUANTIFYING THOSE CRITICAL PARAMETERS THAT DRIVE SOFTWARE. AN "EXPERT SOFTWARE COST ESTIMATING ASSISTANT" WILL BE PRODUCED. IT WILL BE BASED ON INNOVATIVE ARTIFICIAL INTELLIGENCE (AI) AND KNOWLEDGE ENGINEERING TECHNIQUES AND WILL ENABLE AN ESTIMATOR TO DRAW ON STORED EXPERIENCE AND ARRIVE AT A REASONABLE COST ESTIMATE WITH ALL ASSUMPTIONS INCLUDED.

ANATECH INTERNATIONAL CORP NAVY
3344 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
DR ROBERT S DUNHAM
TITLE:
DEDICATED 3-D ACOUSTIC MULTILAYER RESPONSE MODEL
TOPIC: 90 OFFICE: NSWC

*THE SAFETY OF SUBMARINES REQUIRES THAT THEY BE DESIGNED ACOUSTICALLY QUIET TO AVOID DETECTION. ONE METHOD TO REDUCE ACOUSTIC EMISSION IS TO SURROUND THE HULL WITH A VISCOELASTIC LAYER. IN ORDER TO ACCESS THE EFFECTIVENESS OF THESE VISCOELASTIC LAYERS, IT IS NECESSARY TO DETERMINE THE THREE-DIMENSIONAL (3-D) SURFACE COMPLEX IMPEDANCE AND ACOUSTIC LOSS AS A FUNCTION OF FREQUENCY FOR A STEADY STATE HARMONIC INPUT. THIS PROJECT WILL PROVIDE FOR THE ACCURATE ASSESSMENT OF THE EFFECTIVENESS OF THESE VISCOELASTIC LAYERS BY DEVELOPING AN EFFICIENT, MODULAR, USER-FRIENDLY, DEDICATED 3-D FINITE ELEMENT CODE

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THAT IS CAPABLE OF DETERMINING THE COMPLEX SURFACE IMPEDANCE AS A FUNCTION OF THE STEADY STATE DRIVING FREQUENCY AND ACCURATE MODELING TECHNIQUES FOR THESE UNIQUE GEOMETRIES.

APPLIED FUSION TECHNOLOGIES INC NAVY
PO BOX 9652
FORT COLLINS, CO 80525
CHARLES CONNELLY
TITLE:
RELIABLE WELDING OF HSLA STEELS BY SQUARE WAVE PULSING AN ADVANCED SENSING (EDAP) TECHNIQUE
TOPIC: 5 OFFICE: ONR

*PULSE WELDING TECHNIQUES FOR HSLA STEELS HAVE THE ADVANTAGES OF IMPROVING MICROSTRUCTURE, REDUCING DISTORTION AND INCREASING MECHANICAL PROPERTIES. THE PRIMARY OBJECTIVE IS TO IMPROVE RELIABILITY AND PREDICTABILITY OF WELDING HSLA STEELS. A NEW ADVANCED SENSING SYSTEM "EPAD" WILL PROVIDE REAL TIME PUDDLE SIZE AND QUALITY INFORMATION. THIS WILL IMPROVE THE CAPABILITIES OF AUTOMATED WELDING SYSTEMS. THE USE OF HIGH RESOLUTION, HIGH SPEED VIDEO WILL BE SHOWN AS A VIABLE AND ECONOMIC RESEARCH TOOL AND A METHOD OF MAINTAINING VISUAL RECORDS FOR ANALYTICAL STUDY. FOUR AREAS OF RESEARCH WILL BE DERIVED FROM ONE STUDY, PULSE WELDING OF HSLA STEELS, DATA BASE DEVELOPMENT FOR A710 STEELS, EVALUATING THE EDAP CONTROL SYSTEM, AND DEMONSTRATING THE VALUE OF HIGH SPEED VIDEO FOR CONDUCTING RESEARCH.

APPLIED PHYSICS INC DARPA
5353 WYOMING BLVD NE - STE 3
ALBUQUERQUE, NM 87109
DR RICHARD HOLLAND
TITLE:
RCS CALCULATION/REDUCTION BY AN INTERACTIVE SYSTEM
TOPIC: 14 OFFICE: DARPA

PHASE I ESTABLISHED AND DEMONSTRATED A FORMATTING APPROACH FOR DEFINING THE TOPOLOGY OF AN RCS PROBLEM. APPLIED PHYSICS, INC. ESTABLISHED A BODY UNIQUE COORDINATE SYSTEM WHICH ALLOWED THE SOLUTION OF THE RCS OF AN OBJECT BASED ON THE COORDINATE SPACE OF THE OBJECT. THUS, INSTEAD OF HAVING GRID SPACE WHICH CONTAINED DISCONTINUITIES DUE TO ORTHOGONAL SPACE SYSTEM - THIS APPROACH ALLOWED THE SOLUTION IN TERMS OF THE CONTINUOUS SPACE AS DEFINED BY THE OBJECT. THIS APPROACH HAS DEMONSTRATED A SIGNIFICANT ENHANCEMENT IN THE SPEED

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AND ACCURACY OF THE RCS PREDICTION FOR THE BODY. THE PURPOSE OF PHASE II IS TO EXPAND THE CONCEPT TO THREE-DIMENSIONAL PROBLEMS. APPLIED PHYSICES, INC. ALSO PLANS TO INCORPORATE A UNIQUE AND POWERFUL GRAPHICAL DISPLAY CONCEPT TO ALLOW THE USER THE ABILITY TO WATCH THE RCS OF A BODY BE DISPLAYED ON THE SCREEN AS A FUNCTION OF TIME. THIS ATTRIBUTE WILL SIGNIFICANTLY ENHANCE THE UNDERSTANDING OBTAINED FROM THE DATA. INSTEAD OF LOOKING AT A PRINTOUT OR A SINGLE PLOT OF THE DATA AS NUMBERS OR A LINE DRAWING, THE ANALYST WILL BE ABLE TO WATCH ELECTRIC AND MAGNETIC CURRENTS TRAVEL ALONG THE BODY, AS WELL AS WATCH ELECTRICALLY AND MAGNETICALLY FORMED "HOT" SPOTS, MULTI-BOUNCE AND OTHER VERY MEANINGFUL ARTIFACTS WHICH WILL PROVIDE INSIGHTS THAT HAS HERETOFORE BEEN MISSING.

APPLIED TECHNOLOGY ASSOCS INC AF
PO BOX 19434
ORLANDO, FL 32814
ROBERT CAVALLERI
TITLE:
ACTIVE COOLING FOR REENTRY VEHICLES
TOPIC: 104 OFFICE: BMO/PMX

TRANSPIRATION COOLED NOSE TIPS (TCNT) ARE AN ATTRACTIVE MEANS FOR PROVIDING ACTIVE COOLING TO RE-ENTRY VEHICLES. THEY HAVE THE ABILITY TO MAINTAIN A STABLE RE-ENTRY VEHICLE SHAPE IN A HARSH THERMAL AND ERROSIVE ENVIRONMENT. THE ABILITY TO ACCURATELY PREDICT TCNT PERFORMANCE IS NOT AT A SUFFICIENT LEVEL TO PERMIT HIGH CONFIDENCE LEVEL PREDICITIONS IN THE NOSE REGION AND IN THE DOWN STREAM COOLING REGION TO BE PERFORMED. THE OBJECTIVE OF THE PROPOSED PHASE II WORK IS TO DEVELOP A MULTI-LAYER THEORETICAL MODEL THAT CONSISTS OF A LIQUID LAYER, A VISCOUS TWO SPECIE BOUNDARY LAYER AND AN INVISCID LAYER. SUBSCALE WIND TUNNEL TESTING WILL BE PERFORMED TO VALIDATE THE RESULTING MODEL. THE MODEL WILL THEN BE EXERCISED TO DETERMINE PERFORMANCE AT GROUND TEST CONDITIONS AND FLIGHT TEST CONDITIONS.

APTEK/TEKCON J V ARMY
2860 S CIRCLE DR - S BLDG/STE 346
COLORADO SPRINGS, CO 80906
WARREN P ROACH
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC PULSE
TOPIC: 93 OFFICE: MED FT. DET

PHASE II ABSTRACT TO BE FURNISHED BY ARMY PROGRAM MANAGER (MR FORRY)

SUBMITTED BY DEPT
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13 AUG 87. TO BE FUNDED WITH 87 FUNDS

ASTRON CORP NAVY
929 W BROAD ST
FALLS CHURCH, VA 22046
ED RATHBUN
TITLE:
VLF TRANSMIT ANTENNA DESIGN
TOPIC: 83 OFFICE: SPAWAR

*A TRANSPORT VHF (25-30 KHz) TRANSMIT SYSTEM ANTENNA WAS STUDIED. SEVERAL INNOVATIVE CONCEPTS WERE ANALYZED AND EVALUATED BOTH IN THE LABORATORY AND THE ANTENNA RANGE. ALL MEASUREMENTS ARE MODELED AT 2.5 TO 3 MHz. THE TECHNIQUES INCLUDE: LOOP, MONOPOLE (INCLUDE SLOW WAVE VERSIONS), CENTER-FED VERTICAL MONOPOLE, AND GROUND AIR INTERFACE DIPOLE. THE PROGRAM STRESSED ANTENNAS WHICH COULD OPERATE IN AREAS WHERE THE GROUND CONDUCTIVITY IS POOR.

ASTRON RESEARCH & ENGINEERING AF
2028 OLD MIDDLEFIELD WAY
MOUNTAIN VIEW, CA 94043
CHARLES POWARS
TITLE:
HIGH PERFORMANCE RAIL MATERIALS FOR ELECTROMAGNETIC GUN
TOPIC: 88 OFFICE: AFATL SAS

RAIL INTEGRITY IS CRITICAL TO ELECTROMAGNETIC GUN PERFORMANCE. ABLATION DEGRADES RAIL DURABILITY, BALLISTICS PERFORMANCE, AND PLASMA ARMATURE BEHAVIOR. OUR PHASE I PROGRAM ANALYTICALLY AND EXPERIMENTALLY DEMONSTRATED COATED MATERIALS FOR MAXIMIZING RAIL TIME-TO-MELT. THIS PHASE II PROGRAM WILL EXTEND THESE RESULTS TO GUN CONDITIONS FOR WHICH MAXIMUM TIME-TO-MELT IS EXCEEDED, AND UNAVOIDABLE RAIL ABLATION OCCURS. OBJECTIVES ARE TO DEMONSTRATE MATERIALS WHICH MINIMIZE ABLATION, AND MINIMIZE PLASMA ARMATURE MASS ADDITION, RESISTANCE INCREASE, ELONGATION, AND RESTRIKE TENDENCY. ABLATION ANALYSES WILL DEFINE RAIL MATERIAL CANDIDATES; CONSIDERATION WILL BE GIVEN TO LOW MOLECULAR WEIGHT METALLIC COATINGS, COMPOSITE GRAPHITE METAL INFILTRATES AND AXIALLY GRADED RAIL MATERIAL SYSTEMS. COUPONS OF MATERIAL CANDIDATES WILL BE FABRICATED AND CHARACTERIZED. ALL MATERIALS WILL BE TESTED AND SCREENED IN A SUBSCALE RAIL GUN. USING AN OPTIMUM MATERIAL SYSTEM, WE WILL FABRICATE RAILS FOR RETROFIT INSTALLATION IN A LARGE SCALE RAIL GUN.

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ASTRON RESEARCH & ENGINEERING AF
2028 OLD MIDDLEFIELD WY
MOUNTAIN VIEW, CA 94043
JOHN D SULLIVAN
TITLE:
GAS TURBINE COMBUSTOR EXIT TEMPERATURE MEASUREMENT
TOPIC: 214 OFFICE: AEDC DOT

THE ACCURATE MEASUREMENT OF GAS TEMPERATURES IN THE COMBUSTOR EXIT SECTION OF JET ENGINES IS REQUIRED BY THE AIR FORCE, AND CURRENT TECHNIQUES DO NOT MEET AIR FORCE NEEDS. MEASUREMENT ERRORS IN THIS ENVIRONMENT ARE DUE PRIMARILY TO THE EXCHANGE OF THERMAL RADIATION BETWEEN THE TEMPERATURE PROBE AND THE COMBUSTOR EXIT ENVIRONMENT. A TECHNIQUE IS PROPOSED BY ASTRON THAT IS A LOGICAL EXTENSION OF THE MEASUREMENT CONCEPT SUCCESSFULLY DEMONSTRATED IN ASTRON'S PHASE I PROGRAM. THIS PHASE II ESSENTIALLY NULLIFIES THE RADIATION CONTRIBUTION TO PROBE HEAT FLUX THROUGH THE USE OF A NOVEL MEASUREMENT CONCEPT. ACCURACIES TO WITHIN + OR - 15 DEG F ARE ANTICIPATED UNDER TYPICAL CONDITIONS. THE THEORETICAL BASIS FOR THIS PROBE AND A DETAILED WORK PLAN ARE CONTAINED IN THIS PROPOSAL.

ATEAM CORP AF
7920 CHAMBERSBURG RD
DAYTON, OH 45424
KENNETH D WILKINSON
TITLE:
TEST EQUIPMENT FOR AVIONICS BEYOND 18 GHz
TOPIC: OFFICE: ASD PW

THE PHASE II EFFORTS FOR TESTING SYSTEMS THAT OPERATE ABOVE 18 GHz WILL COMPLETE THE FOLLOWING SIX TECHNICAL OBJECTIVES WITHIN 24 MONTHS: 1 ESTABLISH A MEANS TO TRANSFER TESTING TECHNOLOGY INFORMATION BETWEEN VARIOUS AIR FORCE PROGRAM OFFICES, OTHER GOVERNMENT AGENCIES, AND INDUSTRY. 2 EXPLORE BUILT-IN-TEST (BIT) CONCEPTS TO SUPPORT FAULT TOLERANT DESIGN IMPLEMENTATION FOR MILLIMETER WAVE LENGTH SYSTEMS. 3 EXPLORE CALIBRATION TECHNIQUES TO SUPPORT MILLIMETER WAVELENGTH TEST SYSTEMS. 4 DEVELOP DESIGN FOR TEST [illegible] SET STANDARD FOR FREQUENCIES ABOVE 18 GHz. 5 DEVELOP NEW [illegible] STRATEGIES FOR DATABASE FOR MICROWAVE FREQUENCY TESTING. 6 EXPLORE [illegible] TIME SIMULATION TESTING CAPABILITY FOR TESTING AT FREQUENCIES [illegible] 18 GHz. COMPLETE [illegible] WITH PHASE III

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THE AIR FORCE AND OTHER FEDERAL AGENCIES TO DEPLOY SUSTAINABLE PRIME SYSTEMS THAT OPERATE IN THE MILLIMETER WAVELENGTH FREQUENCIES.

ATMOSPHERIC & ENVIRONMENTAL RSCH INC/AER AF
840 MEMORIAL DR
CAMBRIDGE, MA 02139
RONALD G ISAACS
TITLE:
INTERSATELLITE IMAGECOMPARISONS - PHASE II: DIGITAL DA ANALYSIS
TOPIC: 159 OFFICE: AFGL/XOP

THE FEASIBILITY OF SUCCESSFULLY TRANSFORMING DIGITAL DATA FROM ONE IMAGING SENSOR (LANDSAR MSS) TO SIMULATE THAT OF ANOTHER (DMSP OLS) WAS DEMONSTRATED IN OUR PHASE I EFFORT. DEVELOPMENT OF THIS PROTOTYPE DIGITAL DATA FORMATTER (DDF) ALGORITHM WAS BASED ON EXPERIENCE GAINED IN ANALYZING CLOUD FIELD CHARACTERISTICS FROM ACTUAL SATELLITE IMAGERY. THIS UNIQUE DATA SET OF CONCURRENT SATELLITE IMAGES FROM FOUR OPERATIONAL SENSORS -- LADSAT, DMSP, NOAA, AND COES -- WAS ACQUIRED DURING THE PHASE I EFFORT. IN PHASE II, WE PROPOSE TO ENHANCE AND AUGMENT THE DDF ALGORITHMS TO TREAT A BROADER DOMAIN OF SENSOR TYPES AND POTENTIAL CLOUD ANALYSIS REGIMES, IMPLEMENT THE CODE AT AFGL, BOTH ON THE CYBER MAINFRAME AND AS A MCIDA UTILITY, AND TEST ITS EFFECTIVENESS AS AN INTERFACE CODE BETWEEN ROUTINELY ACQUIRED DIGITAL IMAGERY DATA AND OPERATIONAL APPLICATIONS MODELS. THIS EFFORT WILL BE SUPPORTED BY THE ACQUISITION OF ADDITIONAL DIGITAL DATA FOR DEVELOPMENT AND TESTING PURPOSES, INCLUDING PLANNING AND REQUESTING A SPECIAL SAVE OF DMSP DIGITAL DATA.

AUTOMATION TECHNOLOGY CORP ARMY
5457 TWIN KNOLLS RD
COLUMBIA, MD 21045
RICHARD K SIMMONS
TITLE:
3-D VIEWING SYSTEM ENHANCEMENTS FOR THE CONTROL OF ROBO VEHICLES
TOPIC: 67 OFFICE: TACOM

IN PHASE I, A BREADBOARD MODEL OF AN ENHANCED 3-D VIEWING SYSTEM, PROVIDING REMOTE VIEWING FOR FRONT LINE MILITARY MISSIONS (RECONNAISSANCE AND TARGET IDENTIFICATION) WAS DEVELOPED AND EVALUATED. KEY SYSTEM FEATURES ARE: COLOR CAMERAS, CONTROLLED ZOOM, FOCUS,

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CAMERA SEPARATION, CONVERGENCE, PAN AND TILT. TESTING DEMONSTRATED IMPROVED MISSION CAPABILITY WHEN COMPARED TO 2-D VIEWING. A SIMPLER OPERATOR CONTROL INTERFACE IS REQUIRED. THE PROPOSED PHASE II PROGRAM WILL PROVIDE A DEMONSTRATION MODEL OF THE 3-D VIEWING SYSTEM, WITH IMPROVED MAN-MACHINE INTERFACE. INCORPORATING VOICE AND MANUAL CONTROL AND USING EXISTING TECHNOLOGY, THE SYSTEM WILL BE COMPUTER-BASED, WIRELESS FOR REMOTE OPERATION, RUGGEDIZED AND DESIGNED TO EASILY INTEGRATE WITH AN AGVT TEST BED OR OTHER VEHICLE DESIGNATED BY THE ARMY. A SMALL, PORTABLE VEHICLE WILL BE PROVIDED FOR DEMONSTRATION. AN OPTIONAL PROGRAM IS ALSO PROPOSED TO DEVELOP ROAD-FOLLOWING INTELLIGENCE FOR VEHICLES USING 3-D VISION.

BAKER W ENGINEERING NAVY
PO BOX 6477 - 218 E EDGEWOOD PL
SAN ANTONIO, TX 78209
JAMES J KULCEZ
TITLE:
IMPROVED MINE CLEARING
TOPIC: 10 OFFICE: NCSC/ONT

*TWO CONCEPTS ARE ADVANCED FOR ACHIEVING HIGH BLAST OVERPRESSURES OVER LARGE SURFACE AREAS, USING MODEST AMOUNTS OF CONVENTIONAL HIGH EXPLOSIVES. PRELIMINARY CALCULATIONS OF PERFORMANCE IN THE PROPOSAL SHOW GOOD PROMISE. WE PROPOSE TO DETERMINE THE FEASIBILITY OF BOTH CONCEPTS BY LIMITED TESTING, AND TO PLAN MORE EXTENSIVE R&D IF TEST RESULTS SHOW ONE OR BOTH CONCEPTS DO INDEED SHOW GOOD PROMISE OF MEETING PROGRAM OBJECTIVES. DELIVERY METHODOLOGY AND EQUIPMENT WOULD BE A SEPARATE DEVELOPMENT.

BERKELEY RESEARCH ASSOCS INC ARMY
PO BOX 241
BERKELEY, CA 94701
NINO R PEREIRA
TITLE:
FACILITY MODIFICATION TO OBTAIN A SOFT X-RAY CAPABILITY
AURORA AT HARRY DIAMOND LABORATORIES
TOPIC: 41 OFFICE: LABCOM/HDL

BASED ON FAVORABLE RESULTS FROM THE PHASE I RESEARCH, AND OTHER IMPROVEMENTS TO THE BREMSSTRAHLUNG PRODUCTION TECHNIQUES AVAILABLE FROM THE AURORA FACILITY i) A USER-READY TEST FIXTURE WILL BE DESIGNED, INSTALLED, AND CHARACTERIZED, AND ii) ENLARGEMENT OF THE

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TEST AREA TO 10,000 CM(2) WILL BE MADE POSSIBLE FOR FUTURE CONSTRUCTION BY A DETAILED ENGINEERING STUDY.

BIHRLE APPLIED RESEARCH INC AF
400 JERICHO TURNPIKE
JERICHO, NY 11753
BILLY P BARNHART
TITLE:
DEVELOPMENT OF A DESIGN GUIDE AND CRITERION FOR DEFININ
DEPARTURE/SPIN RESISTANT FOREBODY CONFIGURATIONS
TOPIC: 30 OFFICE: AFWAL/FI

IT WAS DEMONSTRATED IN THE PHASE I STUDY THAT THE HIGH ANGLE-OF-ATTACK AERODYNAMIC CHARACTERISTICS ARE CONFIGURATION DEPENDENT, AND THAT THE FOREBODY CAN HAVE A SIGNIFICANT INFLUENCE ON THESE CHARACTERISTICS. ALSO, USING AN EXTENSIVE HIGH ANGLE OF ATTACK MILITARY CONFIGURATION BODY-ALONE DATA BASE, A GOOD CORRELATION WAS SHOWN BETWEEN STATIC AND ROTATIONAL AERODYNAMIC CHARACTERISTICS AND FOREBODY DESIGN PARAMETERS. CONSEQUENTLY, A PHASE II EFFORT IS PROPOSED WHOSE OVERALL OBJECTIVE IS TO PREDICT THE AERODYNAMIC CHARACTERISTICS AND RESULTING AIRPLANE RESPONSES AS A FUNCTION OF FOREBODY GEOMETRY. A SYSTEMATIC EXPERIMENTAL INVESTIGATION IS DESCRIBED WHICH DETERMINES THE INFLUENCE OF FINENESS RATIO, CROSS-SECTIONAL AREA, NOSE BLUNTNESS, AND FOREBODY DROOP FOR ISOLATED FOREBODIES AND IN THE PRESENCE OF OTHER AIRPLANE COMPONENTS. IN ADDITION, A TECHNIQUE FOR DETERMINING AIRCRAFT BEHAVIOR ASSOCIATED WITH FOREBODY GEOMETRY IS IDENTIFIED, AS WELL AS METHODS FOR ALTERING THE AERODYNAMIC CHARACTERISTICS ATTRIBUTABLE TO FOREBODIES.

BIO-METRIC SYSTEMS INC ARMY
9932 W 74TH ST
EDEN PRAIRIE, MN 55344
DR MELVIN J SWANSON
TITLE:
STABILIZATION OF PROTEINS BY CROSSLINKING
TOPIC: 18 OFFICE: CRDC

A PROJECT IS PROPOSED TO FURTHER DEVELOP TECHNIQUES FOR STABILIZATION OF PROTEINS BY COVALENT CROSSLINKING. WE PROPOSE TO STABILIZE MONOCLONAL ANTIBODY SPECIFIC FOR T2 TOXIN, MAKING PROVISION FOR IT TO BE IMMOBILIZED IN A FORM USEFUL FOR CROSSLINKING THAT WERE SHOWN DURING THE PHASE I PROJECT TO STABILIZE ANTIBODIES DURING STORAGE AT

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ELEVATED TEMPERATURES. WE ALSO PROPOSE TO APPLY THESE TECHNIQUES TO ENZYME-HAPTEN CONJUGATE TO INCREASE THE STORAGE ABILITY OF BOTH ENZYMATIC AND IMMUNOLOGICAL ACTIVITY (I.E., ABILITY TO BIND COMPLETELY AND RAPIDLY TO IMMOBILIZED ANTIBODY). WE FURTHER PROPOSE TO TEST THE STABILITY OF CROSSLINKED ENZYMES AND ANTIBODIES UNDER FUNCTIONING CONDITIONS (E.G., A BIOCHEMICAL SENSOR IN REAL TIME OR CONTINUOUS FUNCTION MODE).

BIO-METRIC SYSTEMS INC ARMY
9932 W 74TH ST
EDEN PRAIRIE, MN 55344
DR PETER H DUQUETTE
TITLE:
ENZYME IMMUNOASSAY FOR T-2 TETRAOL
TOPIC: 100 OFFICE: MED/R&D

MUCH ATTENTION HAS BEEN FOCUSED UPON THE POSSIBLE USE OF TOXIN BIOLOGICAL AGENTS IN SOUTHEAST ASIA AND AFGHANISTAN. SUCH INCIDENTS INDICATE A NEED FOR IMPROVING THE UNITED STATES' CAPABILITY TO ACCURATELY DETECT THESE TOXINS AT LEVELS WELL BELOW THOSE LETHAL TO HUMANS. ONE OF THE MOST COMMON GROUPS OF NATURALLY OCCURRING TOXINS IS THE TRICHOTHECENE GROUP (E.G., T-2 TOXIN) WHICH CONSISTS OF HIGHLY TOXIC SECONDARY METABOLITE OF MOLDS THAT HAVE BEEN IDENTIFIED AS THE CAUSE OF TOXICOSES IN HUMANS AND ANIMALS. THE U.S. ARMY HAS SPECULATED THAT T-2 TOXIN HAS BEEN USED AND THUS HAS SOUGHT ASSISTANCE IN DEVELOPING ANALYTICAL METHODS FOR DETECTION OF T-2 TOXIN AND ITS CHIEF UNINARY METABOLITE T-2 TETRAOL. A VARIETY OF METHODS ARE AVAILABLE FOR DETERMINING MYCOTOXIN CONTAMINATION IN BIOLOGICAL/ENVIRONMENTAL FLUIDS. MOST OF THESE ASSAYS (E.G., HPLD, GC-MS) REQUIRE EXPENSIVE EQUIPMENT, TRAINED PERSONNEL AND TOO MUCH ASSAY TIME. WE PROPOSE TO DEVELOP AN ENZYME IMMUNOASSAY (EIA) WHICH WILL BE USEFUL FOR THE DETECTION OF LOW CONCENTRATIONS OF T-2 TETRAOL IN URINE WHICH IS ALSO ADAPTABLE FOR DETECTION OF OTHER BIOLOGICAL TOXINS. THE ASSAY IS SIMPLE, FAST, AND CAN BE USED IN A LABORATORY OR FIELD HOSPITAL.

BURTON R TECHNOLOGIES INC NAVY
PO BOX 5676
RALEIGH, NC 27650
RALPH A BURTON
TITLE:
CONTROL OF SURFACE ATTACK BY GALLIUM ALLOYS IN ELECTRIC CONTACTS
TOPIC: 1 OFFICE: ONR

*AN EXPERIMENTAL APPARATUS WILL BE FABRICATED FOR INSTRUMENTED OPERA-

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TION OF CURRENT COLLECTORS IN CONTROLLED ATMOSPHERES. TERNARY ALLOYS OF GALLIUM, INDIUM AND TIN WILL BE MADE AND APPLIED TO SURFACES OF THE CURRENT COLLECTORS AND SUBJECTED TO OPERATION, ACCOMPANIED BY OBSERVATION OF FRICTION, WEAR, CONTACT RESISTANCE, AND CHEMICAL COMPOSITION OF THE FILM AND WEAR DEBRIS. INFORMATION OBTAINED WILL BE USED IN THE FORMULATION OF ADJACENT MATERIALS CHOICES FOR EXTENDED INVESTIGATIONS, AND ULTIMATELY FOR COLLECTOR DEVELOPMENT.

CASTLE TECHNOLOGY CORP NAVY
52 DRAGON COURT
WOBURN, MA 01801
DR J PAUL PEMSLER
TITLE:
PREPARATION AND PROPERTIES OF PURE SYNTHETIC IRON PYRITES FeS2
TOPIC: 97 OFFICE: NSWC

*THERMALLY ACTIVATED LITHIUM ALLOY - IRON PYRITE BATTERIES ARE USED IN A VARIETY OF MILITARY APPLICATIONS. THESE BATTERIES EXHIBIT ABNORMALLY HIGH VOLTAGES DURING THE FIRST SEVERAL MINUTES OF DISCHARGE. THE VOLTAGE TRANSIENT HAS BEEN ASSOCIATED WITH THE PHYSICAL AND CHEMICAL PEOPERTIES OF THE NATURALLY OCCURRING PYRITE USED IN THE CATHODE. THIS PROGRAM SEEKS TO DEMONSTRATE THAT HIGH PURITY SYNTHETIC PYRITE OF CONTROLLED PARTICLE SIZE CAN BE PREPARED FROM COMMERICALLY AVAILABLE, LOW COST STARTING MATERIALS. THE PROPERTIES OF THE SYNTHETIC PYRITE AS A CATHODE IN LiAl-FeS2 SINGLE CELLS WILL BE MEASURED WITH PARTICULAR ATTENTION PAID TO THE INITIAL VOLTAGE TRANSIENT. CATHODE PERFORMANCE WILL BE CORRELATED WITH SYNTHESES VARIABLES.

CHARLES RIVER ANALYTICS INC AF
55 WHEELER ST
CAMBRIDGE, MA 02138
DR GREG L ZACHARIAS
TITLE:
MODEL-BASED METHODOLOGY FOR TERRAIN-FOLLOWING DISPLAY D
TOPIC: 206 OFFICE: AMD/RDO

THE PRIMARY OBJECTIVE OF THE PHASE II EFFORT WILL BE TO VALIDATE AND DEMONSTRATE THE USE OF A MODELBASED DESIGN METHODOLOGY FOR TERRAIN-FOLLOWING DISPLAY DESIGN AND EVALUATION. THE BASIC APPROACH, WHOSE FEASIBILITY WAS DEMONSTRATED UNDER THE PHASE I EFFORT, CENTERS

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ON THE USE OF AN INTEGRATED PILOT/VEHICLE/DISPLAY MODEL WHICH COMBINES GENERAL KNOWLEDGE OF HUMAN PERCEPTION AND PERFORMANCE WITH SPECIFIC KNOWLEDGE OF TERRAIN-FOLLOWING AIRCRAFT AND AVIONICS CAPABILITIES. THE MODEL IS COMPRISED OF SEVERAL STATE-OF-THE-ART SUBMODELS, COVERING VISUAL PERCEPTION, INFORMATION-FUSION, AND CONTINUOUS CONTROL. THE MODEL IS USED WITHIN A FORMAL STRUCTURE PROVIDED BY A PROCEDURE-ORIENTED METHODOLOGY, WHICH GUIDES THE DISPLAY DESIGNER FROM INITIAL FLIGHT TASK DESCRIPTION THROUGH DISPLAY DESIGN SPECIFICATION, EVALUATION, AND ENHANCEMENT. WE PROPOSE TO VALIDATE AND DEMONSTRATE BOTH MODEL AND METHODOLOGY VIA A THREE-TASK PHASE II EFFORT: 1) MAN-IN-THE-LOOP SIMULATOR VALIDATION OF THE BASELINE MODEL STRUCTURE AND PARAMETER VALUES; 2) DEMONSTRATION OF THE METHODOLOGY USING CANDIDATE DESIGNS AND SIMULATOR VERIFICATION; AND 3) DEVELOPMENT OF DEMONSTRATION SOFTWARE AND SPECIFICATIONS FOR A USER-ORIENTED PROTOTYPE SOFTWARE PACKAGE. INTERIM AND FINAL REPORTS WILL SUMMARIZE THE PHASE II STUDY OBJECTIVES, ACCOMPLISHMENTS, AND RECOMMENDATIONS FOR FOLLOW-ON DEVELOPMENT.

COHERENT TECHNOLOGIES INC AF
PO BOX 7488
BOULDER, CO 80306
DR MICHAEL J KAVAYA
TITLE:
DEVELOPMENT OFA PULSED 1.06-MICRON SOLID-STATE COHERENT RADAR FOR WIND VELOCITY AND AEROSOL BACKSCATTER MEASURE
TOPIC: 132 OFFICE: AFSTC/OLAB

THE FEASIBILITY OF DEVELOPING A PULSED 1.06-MICRON SOLID-STATE COHERENT LASER RADAR FOR WIND VELOCITY AND AEROSOL BACKSCATTER MEASUREMENT WAS ESTABLISHED DURING PHASE I. IT IS NOW POSSIBLE TO STABILIZE A Nd:YAG LASER SUCH THAT COHERENT OBSERVATIONS ARE POSSIBLE. THIS PROPOSED PHASE II EFFORT IS TO DEVELOP THE HARDWARE AND SOFTWARE AND DEMONSTRATE THE COHERENT LIDAR CAPABILITY BY PERFORMING BOTH CALIBRATED TARGET AND ATMOSPHERIC MEASUREMENTS. THE PHASE II EFFORT WILL DEVELOP AND DEMONSTRATE THIS NEW TECHNOLOGY. THE DESIGN WILL BE FIRMED DURING GROUND PERFORMANCE TESTING, AND THESE RESULTS INCORPORATED INTO THE COMPUTER SIMULATION. THE COMPUTER SIMULATION SHOULD THEN BE ABLE TO PREDICT PERFORMANCE AND DESIGN ACCURATELY FOR COMMERCIAL AND SPACE BASED APPLICATIONS. SOLID-STATE LASER RADAR SYSTEMS OFFER THE POTENTIAL OF BEING COMPACT AND OPERATIONAL. THE LASER RADAR INSTRUMENT PARAMETERS WERE DESIGNED FOR ATMOSPHERIC MEASUREMENTS TO 20 km RANGE. COHERENT PERFORMANCE VALUES WILL BE

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OBTAINED AND USED IN A COMPUTER SIMULATION TO EXTRAPOLATE TO SATELLITE CONDITIONS. A MASTER OSCILLATOR POWER AMPLIFIER OPTICAL CONFIGURATION IS PROPOSED. PARTICULAR DESIGN FEATURES OF THE LASER RADAR ARE: PULSE POWER OF .5 J/PULSE, PULSE DURATION OF .5 MICROSEC, PRF OF 50 Hz, 30 cm OFF-AXIS TELESCOPE, AND DIGITAL SIGNAL DATA PROCESSING.

COLORADO RESEARCH DEVELOPMENT CORP DARPA
2629 REDWING RD - CREEKSIDE 2/STE 319
FORT COLLINS, CO 80526
JOHN E MAHAN
TITLE:
SEMICONDUCTING TRANSITION METAL SILICIDES: NEW SILICON COMPATIBLE ELECTRO-OPTIC MATERIALS
TOPIC: 3 OFFICE: DARPA

THE GOAL OF THIS WORK IS TO OBTAIN SINGLE CRYSTAL FILMS OF SEMICONDUCTING FeSi2 AND MnSi(1.7). THE PROPOSED RESEARCH WILL EMPLOY AN ULTRA-HIGH VACUUM MBE-LIKE DEPOSITION SYSTEM TO EXPLORE THE EPITAXIAL GROWTH OF THE TWO MATERIALS ON SILICON. STRUCTURAL AND COMPOSITIONAL CHARACTERIZATION WILL BE ACCOMPLISHED WITH HIGH RESOLUTION X-RAY DIFFRACTION, RUTHERFORD BACKSCATTERING, SCANNING AND TRANSMISSION ELECTRON MICROSCOPY, AND THE AUGER AND ESCA SPECTROSCOPIES. THERE WILL BE AN EFFORT TO MINIMIZE THE CARRIER CONCENTRATION OF FILMS NOT INTENTIONALLY DOPED, AND TO DEVELOP TECHNIQUES FOR CONTROLLED DOPING OF THE FILMS DURING GROWTH.

COMPUTER AIDED PLANNING & SCHEDULING INC NAVY
3715 NORTHSIDE PKWY NE-BLDG 300/STE 715
ATLANTA, GA 30327
WILLIAM G NULTY
TITLE:
INTERACTIVE LOGISTICS WORKSTATION DESIGN
TOPIC: 4 OFFICE: ONR

*THE OBJECTIVE OF THE PROPOSED EFFORT IS THE DESIGN AND CONSTRUCTION OF A MICROCOMPUTER-BASED WORKSTATION WHICH MAKES IT EASY FOR LOGISTICS PLANNERS TO MODEL AND ANALYZE THEIR PROBLEM. THE DESIGN WILL BE BASED ON CONCEPTS OF INTERACTIVE OPTIMIZATION - A PROBLEM SOLVING METHODOLOGY WHICH EMBODIES OPTIMIZATION COMPONENTS IN A FLEXIBLE STRUCTURE WITH SIGNIFICANT HUMAN PARTICIPATION AND CONTROL. PHASE I WILL FOCUS ON THE DESIGN AND PROTOTYPE OF AN INTERACTIVE LOGISTICS

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WORKSTATION FOR THE VEHICLE ROUTING AND WAREHOUSE LOCATION PROBLEMS. CLASSES OF LOGISTICS PLANNING PROBLEMS.

CRAIG DEVELOPMENT CORP AF
7767 E QUAKER RD
ORCHARD PARK, NY 14127
DWIGHT R CRAIG
TITLE:
VERY HIGH POWER DENSITY BATTERIES FOR AIRBORNE APPLICAT
TOPIC: 61 OFFICE: AFWAL/PO

THE AIR FORCE NEEDS HIGH POWER DENSITY RESERVE BATTERIES FOR AIRBORNE APPLICATIONS WHICH MUST PROVIDE PULSES OF POWER AT RATES OF OVER 10,000 W/# DURING A LIFETIME OF 300 SECONDS. AN AVERAGE ENERGY DENSITY REQUIREMENT OF 50 Wh/# AND THE RESULTANT AVERAGE POWER DENSITY OF 600 W/# MAKE THIS A VERY CHALLENGING TASK FOR TODAY'S COMMERCIAL AND DEVELOPMENT BATTERIES. THE ENCLOSED PROPOSAL DESCRIBES AN INNOVATIVE CONCEPT FOR EXTREMELY HIGH POWER DENSITY, FUNCTIONING ON PRINCIPLES NOT PREVIOUSLY USED IN ELECTROCHEMICAL POWER SYSTEMS. WORK IN 100,000 W/# IN SYSTEMS OF AT LEAST 100 Wh/# AND 13 Wh/CU. IN. THE BATTERY CAN BE OPERATED THROUGHOUT A TEMPERATURE RANGE OF AT LEAST -650 DEG F TO +165 DEG F WITHOUT LOSS OF CAPACITY IN PULSE, CONTINUOUS, OR MIXED, CHARGE OR DISCHARGE REGIMES. THIS IS A SECONDARY BATTERY (ELECTRICALLY RECHARGEABLE) AND IT CAN BE OPERATED IN EITHER A PRIMARY OR SECONDARY MODE, FULLY CHARGED AND/OR DISCHARGED AT RATES FROM FRACTIONS OF A SECOND TO SEVERAL YEARS; CYCLED INDEFINITELY AT 100 PERCENT DEPTH-OF-DISCHARGE; AND IT IS BELIEVED TO BE FEASIBLE FOR A FULL-CHARGE, STANDBY MODE FOR AN INDEFINITE PERIOD OF TIME IN AIRBORNE ENVIRONMENTS. THE ATTACHED PROPOSAL DESCRIBES A PLAN OF WORK THAT WILL EXTEND DEVELOPMENT OF THIS CONCEPT TO THE LEVEL OF PROTOTYPE MULTI-CELL BATTERIES INTENDED FOR AIR FORCE APPLICATIONS.

CREARE INC NAVY
PO BOX 71
HANOVER, NH 03755
DR HERBERT SIXSMITH
TITLE:
GAS BEARING TURBOEXPANDERS FOR SHIPBOARD NITROGEN/OXYGE LIQUEFIERS
TOPIC: 36 OFFICE: NAVSEA

*SHIPBOARD LIQUEFIERS IN USE BY THE NAVY FOR PRODUCING LIQUID OXYGEN

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AND LIQUID NITROGEN EMPLOY HIGH-SPEED TURBOEXPANDERS WITH OIL-LUBRICATED BEARINGS. MECHANICAL SHAFT SEALS WITH BUFFER GAS STAGES ARE USED IN THESE MACHINES TO PREVENT CONTAMINATION OF THE SYSTEM BY THE LUBRICANT. SUCCESSFUL CONTINUOUS OPERATION OF THE TURBOEXPANDERS, AND THE LIQUEFIER SYSTEM AS A WHOLE, DEPENDS UPON THE INTEGRITY OF THE TURBOEXPANDER SHAFT SEALS, AND ON THE RELIABILITY OF THE OIL LUBRICATION PUMP AND FILTERING SYSTEM. OIL CONTAMINATION FROM LEAKING SEALS, OR INTERRUPTION OF THE TURBOEXPANDER BEARING OIL SUPPLY RESULTS IN EXTENSIVE SYSTEM DOWNTIME AND RELATED HIGH MAINTENANCE COSTS. THE NAVY NEEDS AN ALTERNATIVE TURBOEXPANDER DESIGN WHICH IS HIGHLY RELIABLE IN OPERATION, AND WHICH WILL ELIMINATE THE POTENTIAL FOR CONTAMINATION OF THE PRODUCT GASES INHERENT IN THE PRESENT HARDWARE. THIS PROPOSAL DESCRIBES PHASE I OF A PROJECT TO DEVELOP A TURBOEXPANDER OPERATING IN GAS BEARINGS FOR SHIPBOARD LIQUEFIERS. PHASE I CONSISTS OF ESTABLISHING SPECIFICATIONS FOR THE TURBOEXPANDER, DESIGNING A SHAFT/GAS-BEARING SYSTEM WHICH WILL MEET THESE SPECIFICATIONS AND PRODUCING A PRELIMINARY DESIGN OF THE TURBOEXPANDER.

CREARE INC AF
PO BOX 71
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DR BHARATAN R PATEL
TITLE:
DEVELOPMENT OF A LOW TEMPERATURE LOW PRESSURE WATER SEPARATOR
TOPIC: 2 OFFICE: ASD/AE

THE PROPOSED PHASE II PROJECT ADDRESSES THE DEVELOPMENT AND FLIGHT TESTING OF A LOW TEMPERATURE, LOW PRESSURE WATER SEPARATOR FOR SMALL/MEDIUM AIRCRAFT ENVIRONMENTAL CONTROL SYSTEMS (ECS). IN PHASE I OF THIS PROJECT, WE DEMONSTRATED THE FEASIBILITY OF SUCH A DEVICE THROUGH ACTUAL TESTING OF TWO CONCEPTS UNDER NEAR-PROTOTYPICAL CONDITIONS. THE EFFICIENCIES ACHIEVED FOR THESE TWO CONCEPTS WAS GREATER THAN EXPECTED. IN PHASE II, THEREFORE, WE PROPOSED TO SELECT ONE OF THESE CONCEPTS AND DEVELOP IT INTO AN AIRCRAFT PROTOTYPE THAT WILL BE INSTALLED AND TESTED IN A FIGHTER AIRCRAFT.

CREARE INC AF
PO BOX 71
HANOVER, NH 03755
CHRISTOPHER J CROWLEY
TITLE:
MAGNETIC PUMPING FOR THERMAL LOOPS
TOPIC: 35 OFFICE: AFWAL/FI

PLANNED AND FUTURE MISSIONS FOR SPACECRAFT REQUIRE THERMAL LOOPS WITH

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HIGH RELIABILITY AND HIGHER HEAT TRANSPORT RATES. INNOVATIVE ALTERNATE MEANS TO PUMP THE FLOWS IN THESE THERMAL LOOPS ARE BEING SOUGHT. PHASE I OF THIS PROJECT HAS DEMONSTRATED THE TECHNICAL FEASIBILITY OF A NOVEL MAGNETIC PUMP. THE MAGNETIC PUMP USES A TRAVELLING ELECTROMAGNETIC WAVE TO DRIVE A FLUID WHICH HAS A HIGH MAGNETIC SUSCEPTIBILITY. THIS MAGNETIC PUMP IS ATTRACTIVE BECAUSE IT OFFERS HIGH RELIABILITY (NO MOVING PARTS WITHIN THE HYDRAULIC BOUNDARY) AND A WIDE RANGE OF FLOW AND PRESSURE CONTROL (VIA THE VOLTAGE, CURRENT OR FREQUENCY IN THE ELECTROMAGNETIC FIELD). THE GENERAL OBJECTIVE OF THE PHASE II EFFORT IS TO DEVELOP THE DESIGN METHODOLOGY FOR A MAGNETICALLY PUMPED SINGLE-PHASE OR TWO-PHASE THERMAL LOOP. THE TECHNICAL EFFORT TO ACCOMPLISH THIS OBJECTIVE INCLUDES TESTING A LABORATORY PROTOTYPE OF THE MAGNETIC PUMP (AT PROTOTYPICAL PIPE SIZE, HEAT, AND MASS FLUX) IN A THERMAL LOOP. THE DEVELOPMENT OF THE DESIGN METHODOLOGY INVOLVES UPGRADING A PRELIMINARY ANALYSIS (DEVELOPED IN PHASE I) FOR THE PUMP, IMPLEMENTING AN ANALYSIS FOR THE BALANCE OF THE THERMAL LOOP, AND VERIFYING THE ANALYSIS BY COMPARISON WITH THE EXPERIMENTAL DATA. THE DESIGN METHODOLOGY WILL BE USED TO OPTIMIZE AND CALCULATE THE PERFORMANCE, PARTICULARLY THE HEAT TRANSPORT RATE, FOR ENGINEERING PROTOTYPES.

CVD INC ARMY
185 NEW BOSTON ST
WOBURN, MA 01801
DR JITENDRA S GOELA
TITLE:
DEVELOPMENT OF CgZnTe AS A SUBSTRATE FOR HgCdTe DETECTO
TOPIC: 44 OFFICE: CECOM/NVEO

NO ABSTRACT FOR CVD INC

DAUBIN SYSTEMS CORP ARMY
104 CRANDON BLVD - STE 315
KEY BISCAYNE, FL 33149
SCOTT C DAUBIN
TITLE:
PHASE II COHERENT DOPPLER SODAR SONDE R AND D
TOPIC: 28 OFFICE: LABCOM/ASL

BASED ON THE SUCCESS OF THE PHASE I EFFORT, IT IS PROPOSED IN PHASE II TO DEVELOP AND DELIVER AN EXPERIMENTAL PROTOTYPE COHERENT DOPPLER SODAR SONDE (EP/CDSS) SYSTEM, CAPABLE OF REACHING 3 km AND BEYOND

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IN HEIGHT AND A HEIGHT RESOLUTION OF LESS THAN 20 METERS THROUGHOUT THE REGION FROM THE BOUNDARY LAYER TO MAXIMUM HEIGHT AND A WIND SPEED RESOLUTION OF 1 m/s. INCIDENT TO DELIVERY, THE SYSTEM WILL BE FIELD DEMONSTRATED BY THE DEVELOPER. THE PROPOSAL PRESENTS THE RESULTS OF THE PHASE I RESEARCH AND THE CONSEQUENT APPLICATION OF THE INFORMATION THUS DERIVED TO THE PHASE II EP/CDSS SYSTEM DESIGN.

DEACON RE. CH SDIO
900 WELCH RD - STE 203
PALO ALTO, CA 94304
DAVID A G DEACON
TITLE:
CALCULATION OF THE ANGULAR SPECTRUM OF THE COHERENT HAR RADIATED IN THE FREE ELECTRON LASER
TOPIC: 17 OFFICE: IST

NO ABSTRACT FOR DEACON RESEARCH

DECISION SCIENCE CONSORTIUM INC AF
7700 LEESBURG PIKE - STE 421
FALLS CHURCH, VA 22043
MARVIN S COHEN
TITLE:
ARTIFICIAL INTELLIGENCE (AI) DEVELOPMENT FOR PILOT AID APPLICATIONS
TOPIC: 20 OFFICE: AFWAL/AA

THE SUCCESSFUL INTRODUCTION OF AI TECHNOLOGY INTO AIR FORCE AVIONICS HAS BEEN HINDERED BY THE NEED FOR INTELLIGENT REAL-TIME REASONING WITH INCOMPLETE AND OFTEN INCONSISTENT DATA. THE PRIMARY OBJECTIVE OF THE PRESENT RESEARCH IS THE DEVELOPMENT OF AN INNOVATIVE FRAMEWORK FOR EXPERT SYSTEM REASONING WHICH COMBINES QUANTITATIVE MANIPULATION OF UNCERTAINTY, A QUALITATIVE FRAME FOR REPRESENTING AN EVIDENTIAL ARGUMENT, AND AN NON-MONOTONIC CAPABILITY FOR REVISING PROBABILISTIC ARGUMENTS WHEN THEY LEAD TO CONFLICT. IN PHASE I THIS FRAMEWORK, ALONG WITH A PERSONALIZED USER INTERFACE, WAS IMPLEMENTED IN A SMALL-SCALE DEMONSTRATION SYSTEM: THE ADAPTIVE ROUTE REPLANNER (ARR). RESULTS WITH ARR STRONGLY CONFIRMED THE FEASIBILITY OF A SYSTEM WHICH REASONS INTELLIGENTLY AND FLEXIBLY IN THE FACE OF UNCERTAINTY. IN PHASE II WE PROPOSE TO CARRY THIS WORK FORWARD IN FIVE TASKS: (i) REFINEMENT OF ARR SYSTEM DESIGN AND ALGORITHMS; (ii) ELICITATION TECHNIQUES APPROPRIATE TO EXPERT AND DEVELOPMENT OF INNOVATIVE KNOW-

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LEDGE ELICITATION TECHNIQUES APPROPRIATE TO ARR'S INNOVATIVE INFERENCE FRAMEWORK; (iii) FULL IMPLEMENTATION OF ARR; (iv) TESTING AND DEMONSTRATION OF THE COMPLETED SYSTEM; AND (v) EXTRACTION OF GENERAL PRINCIPLES AND GUIDELINES FOR INFERENCE AND KNOWLEDGE ELICITATION IN REAL-TIME TACTICAL DOMAINS.

DELPHI RESEARCH INC NAVY
701 HAINES AVE NW
ALBUQUERQUE, NM 87102
DR PATRICK M DHOOGE
TITLE:
INDIRECT ANTILASER EYE PROTECTION SYSTEM
TOPIC: 24 OFFICE: SPAWAR

*PERSONNEL REQUIRED SOME MEANS OF EYE PROTECTION AGAINST VARIOUS TYPES OF LASERS WHILE INVOLVED IN OPERATIONAL SITUATIONS, BUT ALSO NEED TO BE ABLE TO SEE IN A NORMAL MANNER. WE PROPOSE HERE AN INDIRECT VIEWING SYSTEM CONTAINING A MIRROR WHICH WILL NOT PASS ANY LIGHT INTENSE ENOUGH TO HARM THE EYE BUT WILL OTHERWISE ALLOW NORMAL VIEWING. THE MIRROR WILL BE CONSTRUCTED OF REFLECTIVE THIN FILM AND ORGANIC GLASS WHICH WILL BE DAMAGED BY INTENSE LIGHT SUFFICIENTLY TO PREVENT THE LIGHT'S REFLECTION. THE PROJECT WILL INVOLVE STUDYING THE APPLICATION OF VARIOUS THIN REFLECTIVE FILMS AND ORGANIC GLASSES TO SUCH A MIRROR, AND SUBSEQUENTLY FABRICATING AND TESTING PREPROTOTYPE ARTICLES.

DIRECTED TECHNOLOGIES INC NAVY
1226 POTOMAC SCHOOL RD
MCLEAN, VA 22101
IRA F KUHN JR
TITLE:
DEWPOINT - AN ANTI-SENSOR SYSTEM FOR TERMINAL PHASE FLE
DEFENSE AGAINST OPTICAL AND RF HOMING MISSILES
TOPIC: 86 OFFICE: NSWC/DL

*THE DEWPOINT CONCEPT UTILIZES CO-ALIGNED HIGH POWER MICROWAVE AND MODERATE POWER LASER DEVICES TO IRRADIATE OPTICAL AND/OR RF RECEIVERS IN THE INCOMING ANTI-SHIP MISSILE. THIS FLEET DEFENSE WEAPON CONCEPT HAS THREE IMPORTANT CHARACTERISTICS: 1. ABILITY TO PERMANENTLY OR INTERMITTENTLY DEBILITATE THE GUIDANCE/HOMING SUBSYSTEM OF ALL CLASSES OF THREAT ANTI-SHIP MISSILE EXCEPT PURE BALLISTIC NUCLEAR WARHEAD MISSILES. 2. NEAR-TERM DEPLOYMENT ON EXISTING SHIPS (I.E., BOLT-ON

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CAPABILITY BY EARLY 1990s) AND POTENTIAL FOR FAR-TERM DEPLOYMENT ON FLEET AIRCRAFT, 3. MAXIMAL EFFECTIVENESS WHEN USED IN CONJUNCTION WITH RAPIDLY DEPLOYABLE OFFBOARD RF OPTICAL DECOYS AND JAMMERS. THE PROPOSED PHASE I EFFORT WILL EVALUATE ALTERNATIVE CONFIGURATIONS (RF AND OPTICAL SOURCE TECHNOLOGIES, FREQUENCY, WAVEFORM) FOR THE SHIP-BORNE DEWPOINT SYSTEM AND DEVELOP A CONCEPTUAL DESIGN WHICH INCLUDES MICROWAVE AND LASER COMPONENTS, BEAM DIRECTOR, PRIME POWER, AND TARGETING.

DISPLAYTECH INC AF
PO BOX 7246
BOULDER, CO 80306
MARK A HANDSCHY
TITLE:
FABRICATION OF FIBER OPTIC SWITCHES WITH FERROELECTRIC LIQUID CRYSTALS
TOPIC: 172 OFFICE: RADC/XPX

THE PROPOSED PROJECT AIMS TO DEVELOP ELECTRO-OPTIC ROUTING SWITCHES SUITABLE FOR FIBER OPTIC NETWORKS. BY EMPLOYING LIGHT VALVES USING FERROELECTRIC LIQUID CRYSTALS, THE DEVICES TO BE DEVELOPED WOULD EXHIBIT MICROSECOND TO SUBMICROSECOND SWITCHING TIMES, LOW ELECTRICAL POWER CONSUMPTION, LOW INSERTION LOSS, AND LOW CROSSTALK, EVEN WITH UNPOLARIZED, MULTIMODE INPUT LIGHT. THE SWITCHING WILL BE ACCOMPLISHED BY A TRANSMISSION/TOTAL-INTERNAL-REFLECTION SCHEME,

DISTRIBUTION ANALYSIS RSCH & TECH INC NAVY
ONE BALA PLAZA - STE 511
BALA CYNWYD, PA 19004
HELEN MORRISON
TITLE:
INTERACTIVE SHIP SCHEDULING ON A MICRO COMPUTER
TOPIC: 4 OFFICE: ONR

*WE PROPOSE TO DEVELOP AN INTERACTIVE OPTIMIZATION SYSTEM FOR CARGO SHIP SCHEDULING. THE SYSTEM WILL BE RESIDENT ON A MICRO VAX AND HAVE A COLOR GRAPHICS INTERFACE TO ENABLE EASY INTERACTION. WE WILL USE THIS SYSTEM TO EXPLORE A VARIETY OF RESEARCH QUESTIONS INCLUDING THE APPROPRIATE MODEL FOR SHIP SCHEDULING, DETAILED DESIGN OF THE OPTIMI-ZATION ALGORITHM TO ACHIEVE RUN TIME EFFICIENCY, AND USEFUL DESIGN OF COLOR GRAPHICS DISPLAYS TO ENABLE EFFECTIVE USER INTERACTION. OUR WORK WILL BE BASED IN PART ON PRIOR SUCCESSFUL RESEARCH FUNDED BY THE

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OFFICE OF NAVAL RESEARCH.

DYNA EAST CORP AF
3132 MARKET ST
PHILADELPHIA, PA 19104
RICHARD M WEST
TITLE:
CUTTER CHARGE WARHEAD FOR DEFEAT OF ADVANCED ARMOR
TOPIC: 182 OFFICE: AFATL MNW

RECENT DEVELOPMENTS IN ARMOR TECHNOLOGY AND THE INTRODUCTION OF REACTIVE APPLIQUES HAVE GREATLY REDUCED THE LETHALITY OF CURRENT MISSILE WARHEADS. WARHEADS CAPABLE OF DEFEATING THESE ADVANCED ARMORS MUST BE DEVELOPED. IMPROVEMENTS IN CONICAL WARHEADS, SUCH AS INCREASING THE DENSITY OF THE LINER IN A SHAPED-CHARGE DEVICE, ARE BEING RESEARCHED. TWO-STAGE CONCEPTS UNDER INVESTIGATION BY THE BALLISTICS RESEARCH LABORATORY AND OTHERS MAY ALSO OFFER IMPROVEMENTS IN PERFORMANCE BUT ARE NOT EASILY INCORPORATED INTO A MISSILE SYSTEM. IN THE PHASE I PROGRAM, THE FEASIBILITY OF A UNIQUE TWO-STAGE WARHEAD CONCEPT WAS SUCCESSFULLY DEMONSTRATED. THE OBJECTIVE OF THE PROPOSED PHASE II PROGRAM IS TO FURTHER DEVELOP THE CUTTER CHARGE WARHEAD. FOUR TASKS HAVE BEEN IDENTIFIED: CONCEPT DEVELOPMENT, WARHEAD DESIGN AND ANALYSIS, WARHEAD FABRICATION AND TEST, AND WARHEAD SUBSYSTEM INTEGRATION. DYNA EAST'S EXPERIENCE IN TWO-STAGE WARHEAD DESIGN AND JET/ARMOR INTERACTION MAKES US UNIQUELY QUALIFIED TO FURTHER DEVELOP THIS PROMISING WARHEAD CONCEPT.

DYNA EAST CORP ARMY
3132 MARKET ST
PHILADELPHIA, PA 19104
WILLIAM J ELIS
TITLE:
HIGH-PERFORMANCE WARHEAD FOR FLY-OVER-SHOOT-DOWN MISSIL
TOPIC: 61 OFFICE: MICOM

THE DEVELOPMENT OF A HIGH-PERFORMANCE SHAPED-CHARGE WARHEAD FOR A FLY-OVER, SHOOT-DOWN MISSILE ATTACKING CONVENTIONAL AND REACTIVE ARMORS IS PROPOSED. THE WARHEAD INTEGRATES THREE PENETRATION-ENHANCED CONCEPTS: THE CURVED JET, HIGH-VELOCITY JET DESIGN, AND HIGH-SOUND-SPEED LINER MATERIAL. THE WARHEAD WILL BE DEVELOPED THROUGH A SYSTEMATIC PROGRAM OF ITERATIONS OF COMPUTER-AIDED WARHEAD DESIGN, FABRICATION, TESTING, AND ANALYSIS. DEVELOPMENT WILL BE

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ASSISTED BY THE ANALYTICAL MODELS OF JET PENETRATION OF CONVENTIONAL ARMOR WITH TRANSVERSE VELOCITY DEVELOPED IN PHASE I AND A PROPOSED SIMILAR MODEL FOR REACTIVE ARMORS. THE RESULT WILL BE A WARHEAD WITH ESTIMATED PERFORMANCE IMPROVED BY A FACTOR OF FOUR (4) TO SIX (6) OVER CONVENTIONAL STATE-OF-THE-ART SHAPED CHARGES.

DYNAMET TECHNOLOGY INC ARMY
EIGHT A STREET
BURLINGTON, MA 01803
STANLEY ABKOWITX
TITLE:
DUCTILE ALLOY ENCAPSULATED CERAMIC ARMOR DEVELOPMENT
TOPIC: OFFICE: LABCOM/MTL

IN RESPONSE TO EVER MORE POTENT BALLISTIC THREATS TO MILITARY ARTICLES, CONSIDERABLE EFFORTS HAVE BEEN MADE TO IMPROVE THE CAPABILITIES OF ARMOR SYSTEMS. SOME OF THESE EFFECTS HAVE BEEN DIRECTED AT INCORPORATING CERAMIC MATERIALS INTO ARMOR SYSTEMS. THE HIGH INITIAL BALLISTIC TOLERANCE AND LIGHTWEIGHT OF THESE MATERIALS ARE OF GREAT BENEFIT, BUT THEIR INHERENT LACK OF TOUGHNESS DEPRIVES THEM OF A MUCH DESIRED REPEAT HIT CAPABILITY. DYNAMET'S PHASE I PROGRAM SOUGHT TO PROPERLY SUPPORT AND CONTAIN CERAMIC MATERIALS BY CLAPPING THESE MATERIALS WITH DUCTILE ALLOYS APPLIED VIA ADVANCED POWDER METAL PROCESSES. SUCCESSFULLY APPLIED, IT IS CONSIDERED LIKELY THAT THIS APPROACH COULD IMPART REPEAT HIT CAPABILITY TO THESE CERAMIC MATERIALS. ALTHOUGH PHASE I DEMONSTRATED MANUFACTURING FEASIBILITY, THIS PRELIMINARY PROGRAM COULD NOT FULLY ASSESS THE POTENTIAL CAPABILITIES OF THE PROCESS. OBSERVATIONS MADE DURING THE PHASE I PROGRAM, AND IN ADDITIONAL WORK PERFORMED INDEPENDENTLY, HAVE INDICATED SEVERAL PROCESS MODIFICATIONS WHICH SHOULD OPTIMIZE THE ORIGINAL PROCESSING TECHNOLOGY. EXPERIMENTAL APPROACHES OTHER THAN THE CLAPPING OF MONOLITHIC PLATES HAVE ALSO BEEN DEVISED WHICH WOULD BETTER UTILIZE THE CAPABILITIES PROVIDED BY P/M TECHNIQUE. POWDER METAL TECHNOLOGY OFFERS UNIQUE METHODS OF POTENTIALLY PROTECTING CERAMIC MATERIALS FROM DISINTEGRATING UPON IMPACT AND OF ORIENTING SHAPED CERAMICS IN ANY DESIRED MANNER. POSITIVE RESULTS OF THE PROPOSAL PHASE II PROGRAM WOULD GREATLY EXTEND THE PRACTICAL USES OF THESE HIGHLY IMPACT RESISTANT, LIGHTWEIGHT CERAMIC ARMOR MATERIALS.

YNAMI ANALYSIS & TESTING ASSOCS ARMY
SECOND ST
ENCINITAS, CA 92024
JOHN F APOVICH
TITLE:
EFFICIENT MONITORING OF FLEET CORROSION
TOPIC: OFFICE: TACOM

CORRDBMS IS AN IBM-PC BASED RELATIONAL DATABASE MANAGEMENT SYSTEM

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FOR TRACKING THE CORROSION OF THE ARMY'S WHEELED VEHICLE FLEET. IN PHASE I A COMPUTER CODE WAS DEVELOPED FOR ESTABLISHING A CORROSION DATA STRUCTURE, ENTERING FIELD DATA AND PRODUCING STATISTICAL REPORTS OF THE INFORMATION STORED IN THE SYSTEM. IN PHASE II, A FOUR TASK EFFORT WILL BE UNDERTAKEN TO: a) ESTABLISH A VALID RELIABLE CORROSION DATABASE BY BOTH COLLECTING COMPLETE FIELD DATA AND PERFORMING CONTROLLED EXPERIMENTS; b) IMPROVE THE DATA COLLECTION/REPORTING EFFICIENCY BY DEVELOPING A CLIPBOARD COMPUTER FOR USE BY THE FIELD INSPECTORS; c) IMPROVE THE DATA TRANSFER EFFICIENCY LINKING THE DATA COLLECTION CLIPBOARD, THE IBM/PC, AND THE MAINFRAME SDR/MANAGER SYSTEM; AND d) ENHANCE CORRDBMS TO GIVE GRAPHICS DISPLAY, ADDITIONAL FEATURES SUCH AS MEAN TIME TO REPAIR, AND AN IMPROVED STATISTICAL/MATHEMATICAL MODEL OF THE CORROSION DATA.

E-TEK DYNAMICS INC AF
250 EAST DR
MELBOURNE, FL 32901
J J PAN
TITLE:
MULTI-WAVELENGTH NARROW-BAND SOURCES
TOPIC: 169 OFFICE: RADC/XPX

THE THEORETICAL ANALYSES OF PHASE I STUDY INDICATE THAT THE TUNING RANGE OF A 1.3 MICROMETER LASER DIODE COMBINED WITH ELECTRO-OPTIC MODULATORS (EOM) CAN WELL EXCEED 450 A. FOR PHASE II R&D, E-TEK PLANS TO DEVELOP THE PACKAGED MULTIWAVELENGTH NARROW-BAND SOURCES (MNS) TO DEMONSTRATE THE PRACTICALITY, VIABILITY, RELIABILITY, PRODUCIBILITY OF MNS WHICH CAN MEET REAL SYSTEM NEEDS. TO INTEGRATE WITH COMMERCIALLY AVAILABLE LASER CHIPS, THE PRECISION EOMS WILL BE FABRICATED AND CHARACTERIZED AT E-TEK FOR CONSTRUCTING AN ELECTRONICALLY TUNABLE MNS. PRIOR TO THE FINAL MNS DEVELOPED, TWO TUNABLE MNS CONFIGURATIONS WILL BE DESIGNED, FABRICATED, AND TESTED. COMPARING EXPERIMENTAL RESULTS WITH THE THEORETICAL PREDICTIONS, INCLUDING TUNABILITY, TUNING SENSITIVITY, TEMPERATURE EFFECTS, MODULATION FREQUENCY, POST TUNING DRIFT, AND OPTICAL POWER OUTPUT/UNIFORMITY, WILL PRACTICALLY LEAD THE FUTURE DESIGNS MEETING EACH INDIVIDUAL SYSTEM REQUIREMENTS. TO SATISFY THE STRINGENT THERMAL/MECHANICAL TOLERANCES, MINIATURE SIZE, PRECISE DIMENSION REQUIREMENTS, AND ENVIRONMENTAL CONDITIONS, E-TEK WILL EXERCISE ITS ACCUMULATED EXPERIENCE WITH MINIATURE XYZ POSITIONERS AND EXTEND THE ACCURACY TO 0.1 TO 0.2 MICROMETERS. IN PHASE II, THE DELICATE METHODS OF ALIGNMENT/INTEGRATION/PACKAGING WILL BE DEVELOPED AND VERIFIED. THE

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HIGH PERFORMANCE CONTROL/BIAS/STABILITY ELECTRONICS ARE ALSO CONSTRUCTED TO MEET THE MNS SPECIFICATIONS.

EIC LABS INC SDIO
111 DOWNEY ST
NORWOOD, MA 02062
STUART F COGAN
TITLE:
METAL-METAL MICROFILAMENTARY COMPOSITES FOR HIGH CURREN
ELECTRICAL CONDUCTOR APPLICATIONS
TOPIC: 5 OFFICE: IST

NO ABSTRACT FOR EIC LABS INC

EIDETICS INT'L INC (VISUAL AERODYNAMICS) AF
3669 - W 240TH ST
TORRANCE, CA 90505
GERALD N MALCOM
TITLE:
DEVELOPMENT OF NON-CONVENTIONAL CONTROL METHODS FOR HIG
ANGLE-OF-ATTACK FLIGHT USING VORTEX MANIPULATION
TOPIC: 30 OFFICE: AFWAL/FI

FEASIBILITY STUDIES HAVE SHOWN THAT MANIPULATION OF FOREBODY AND LEX VORTICES ON FIGHTER-TYPE AIRCRAFT CONFIGURATIONS CAN BE AN EFFECTIVE METHOD OF IMPROVING HIGH ANGLE OF ATTACK CONTROL AND ENHANCING THE POTENTIAL FOR INCREASED MANEUVERABILITY. THE OBJECTIVE OF THIS STUDY IS TO EXTEND THE RESEARCH BEYOND FEASIBILITY DEMONSTRATION AND TO SYSTEMATICALLY CONSTRUCT A DATA BASE ON A GENERIC FIGHTER CONFIGURATION TO DEMONSTRATE THE UTILITY OF VORTEX MANIPULATION AS VIABLE AND PRACTICAL OPTION FOR EFFECTIVE AIRCRAFT CONTROL AT HIGH ANGLES OF ATTACK. RESEARCH EFFORTS WILL CONCENTRATE ON MEANS TO MANIPULATE THE FOREBODY AND LEX VORTEX FLOWS THROUGH THE USE OF SMALL GEOMETRIC MODIFIERS (MECHANICALLY-DRIVEN OR FIXED NON-CONVENTIONAL SURFACES, SUCH AS STRAKES, FENCES OR SPOILERS) AND BY PNEUMATIC TECHNIQUES SUCH AS SURFACE BLOWING. THE STUDY WILL CONCENTRATE ON SORTING OUT THE MOST EFFECTIVE METHODS THROUGH EXTENSIVE TESTS USING WATER AND WIND TUNNEL FACILITIES ON GENERIC FIGHTER CONFIGURATIONS. ANALYSIS OF STATIC WIND TUNNEL DATA WILL LEAD TO A DEMONSTRATION OF THE UTILITY OF THE MOST PROMISING CONCEPTS WITH A FREE-FLIGHT WIND TUNNEL TEST WITH ONE OF THE GENERIC FIGHTER CONFIGURATIONS. A VORTEX CONTROL SCHEME WILL BE INCORPORATED INTO A FREE-FLIGHT MODEL IN ADDITION TO

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THE CONVENTIONAL CONTROL SYSTEM. A SUCCESSFUL DEMONSTRATION OF VORTEX CONTROL COULD LEAD TO CONTINUED RESEARCH ON A REAL AIRPLANE CONFIGURATION.

EIDETICS INT'L INC (VISUAL AERODYNMICS) AF
3669 W 240TH ST
TORRANCE, CA 90505
W L HAMILTON
TITLE:
TRANSIENT AGILITY ENHANCEMENTS FOR TACTICAL AIRCRAFT
TOPIC: 10 OFFICE: ASD/XR

CURRENT EMPHASIS IS FIGHTER PERFORMANCE ENHANCEMENT AND EVALUATION IS BASED UPON CONVENTIONAL MEASUREMENTS OF MERIT. THE PHASE I SBIR STUDY "TRANSIENT PERFORMANCE AND MANEUVERABILITY MEASURES OF MERIT FOR FIGHTER/ATTACK AIRCRAFT" IDENTIFIED AND VALIDATED ADVANCED METRICS WHICH CAN BE DECIDING FACTORS IN AIR COMBAT. THESE PARAMETERS COMPLEMENT CONVENTIONAL POINT PERFORMANCE AND ENERGY MANEUVERABILITY MEASURES BY ADDRESSING TRANSIENT PERFORMANCE SUCH AS LOADED ROLL AGILITY, POWER ONSET/LOSS RATES AND PITCH ACCELERATION RATES. THE OBJECTIVES OF THIS PROPOSED STUDY INCLUDE: 1) DEMONSTRATE METHODOLOGY FOR QUANTIFYING AND ASSESSING TRANSIENT AGILITY, 2) RELATE TRANSIENT AGILITY TO COMBAT EFFECTIVENESS AND DESIGN PARAMETERS, 3) EVALUATE TRADE-OFFS BETWEEN ENHANCEMENTS TO TRANSIENT AND CONVENTIONAL PERFORMANCE, AND 4) INVESTIGATE TACTICAL, DESIGN AND HUMAN FACTORS IMPLICATIONS OF ENHANCED TRANSIENT PERFORMANCE. THIS STUDY BUILDS ON THE RESULTS OF THE PROCEEDING (PHASE I), MICROSCOPIC ANALYSIS OF AIR COMBAT MANEUVERING AND TEST DATA. THE PROPOSED WORK FEATURES FOUR MAJOR WORK PHASE, EACH CHARACTERIZED BY INCREASING LEVELS OF COMPLEXITY AND SOPHISTICATION IN ITS APPROACH: -- PHASE A-SYSTEMATIC STUDY OF TRANSIENT PERFORMANCE (FLIGHT TEST/MODELING)-- PHASE B- NON REAL-TIME MANNED ACM SIMULATION-- PHASE C- REAL-TIME MANNED ACM SIMULATION--PHASE D- DIGITAL ACM SIMULATION.

EL DORADO ENGINEERING INC NAVY
3460 S REDWOOD RD
SALT LAKE CITY, UT 84119
RALPH W HAYES
TITLE:
ATMOSPHERIC DISPERSION OF ORDNANCE PRODUCTS
TOPIC: 87 OFFICE: NSWC

*THE OBJECTIVE OF THE PROJECT IS TO DEVELOP A MATHEMATICAL MODEL FOR

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PREDICTING DISPERSION FROM OPEN AIR DETONATION OR BURNING OF THE NAVY'S PEP (PROPELLANT EXPLOSIVE, PYROTECHNIC) MATERIALS. THE FIRST STEP OF THE PROJECT WILL BE TO DEFINE THE CONTROLLING PARAMETERS, I.E., PRODUCTS OF COMBUSTION FORMED, PARTICLE SIZE ANALYSES AND PLUM CHARACTERISTICS. GENERALIZED PREDICTION MODELS DEVELOPED FOR CHEMICAL MUNITION WILL THEN BE MODIFIED IN ORDER TO INCORPORATE THE GENERATED DATA DEVELOPED FOR THE NAVY'S MUNITIONS.

ELECTROCHIMICA CORP SDIO
20 KELLY CT
MENLO PARK, CA 94025
DR M EISENBERG
TITLE:
NOVEL HIGH POWER DENSITY BATTERY DESIGN FOR SPACE PRIME
TOPIC: 2 OFFICE: IST

NO ABSTRACT FOR ELECTROCHIMICA CORP

ELECTRONIC DESIGN ASSOCS NAVY
3184-H AIRWAY AVE
COSTA MESA, CA 92626
DR HOWARD JELINEK
TITLE:
AUTOMATED RECOGNITION OF HELIUM SPEECH:
TOPIC: 54 OFFICE: NAVMED

*THIS PROJECT ADDRESSES A METHOD FOR SOLVING THE PROBLEM OF HELIUM SPEECH, AS EXPERIENCED IN DIVER-SURFACE COMMUNICATION. THE GOAL OF THE PHASE I STUDY IS TO DESIGN, PROTOTYPE, AND EVALUATE A REAL TIME HELIUM SPEECH CORRECTOR SYSTEM BASED UPON DIGITAL SIGNAL PROCESSING TECHNIQUES. HIGHER FREQUENCY FORMAT INFORMATION WILL BE EXTRACTED AND RE-INSERTED INTO THE SPEECH WAVE FORM AT AN ADJUSTED FREQUENCY, THEREBY, "RECONSTRUCTING" THE WORDS WITH APPROPRIATE FREQUENCY CORRECTION. THIS WILL BE ACCOMPLISHED IN SIX MONTHS.

ELFIN CORP d/b/a US COMPOSITES ARMY
5 SCIENCE PK
NEW HAVEN, CT 06511
AUGUST H KRUESI
TITLE:
MULTI-HOLLOW COMPOSITE SHELL BRIDGE DECK
TOPIC: 53 OFFICE: BRDC

U.S. COMPOSITES DESIGNED A COMPOSITE BRIDGE DECK TO REPLACE AN

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ALUMINUM DECK IN THE TRI-ARCH PORTABLE BRIDGE. A UNIQUE COMBINATION OF COMPUTER CONTROLLED WET BRAIDING AND RESIN TRANSFER MOLDING IS PLANNED FOR FABRICATION OF THE MULTI-HOLLOW DECK. THE DESIGN INCLUDES A CONTACT STRESS ISOLATION LAYER TO PROTECT THE DECK FROM ABRASION AND CONCENTRATED LOADS UNDER VEHICLE TIRES AND TREADS. A PARTIAL SPAN SEGMENT OF THE DECK WILL BE FABRICATED AND TESTED TO DETERMINE FIBER VOLUME FRACTION, VOID CONTENT, COMPRESSION STRENGTH, COMPRESSION AFTER 1500 IN. LB PER INCH IMPACT, AND CONTACT STRESS TESTING. A FULL SPAN DECK MAY BE FABRICATED TO VERIFY THE MANUFACTURING TECHNIQUE AND ALLOW TESTING OF A COMPLETE UNIT.

ENERGY COMPRESSION RESEARCH CORP ARMY
2043 DE MAYO RD
DEL MAR, CA 92014
OVED S F ZUCKER
TITLE:
NOVEL COMPACT HIGH PEAK AND AVERAGE POWER LARGE TUNABLE BANDWIDTH MICROWAVE GENERATION USING LASS SWITCHES
TOPIC: 46 OFFICE: LABCOM/VAL

THIS IS A PROPOSAL FOR A PHASE II EFFORT FOR SBIR CONTRACT NUMBER DAAL02-86-C-009 CALLED NOVEL, COMPACT, HIGH PEAK AND AVERAGE POWER LARGE TUNABLE BANDWIDTH MICROWAVE GENERATION USING LASS SWITCHES. WE PROPOSE TO CONDUCT EXPERIMENTS TO DEMONSTRATE DIGITAL SYNTHESIS OF A TRAIN OF PULSES IN THE MICROWAVE REGIME (3 GHz). THIS EFFORT WILL BE DIRECTED AT FABRICATION AND TESTING A MULTI PULSE SYSTEM. LATER PARTS OF THE EXPERIMENT WILL BE AIMED AT MODULATING THE OUTPUT WAVEFORM TO DEMONSTRATE THE USEFULNESS OF THIS SYSTEM FOR WIDE BAND JAMMING.

ENERGY CONVERSION DEVICES INC ARMY
1675 W MAPLE RD
TROY, MI 48084
GEORGE CHEROFF
TITLE:
OVONIC THRESHOLD SWITCH (OTS) FOR EMP PROTECTION OF MED ELECTRONIC EQUIPMENT
TOPIC: 93 OFFICE: MED/R&D

THIS DOCUMENT CONTAINS A BRIEF REVIEW OF THE RESULTS, TO DATE, OF THE PHASE I SBIR RESEARCH PROGRAM (CONTRACT # DAMD17-86-C-6158, END DATE AUGUST 25, 1986) AND A DETAILED PROPOSAL FOR THE PHASE II CON-

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TRACT TO DEVELOP THE OVONIC THRESHOLD SWITCH (OTS) FOR EMP PROTECTION OF MEDICAL ELECTRONIC EQUIPMENT. IN PHASE I, IT WAS DEMONSTRATED THAT THE FUNDAMENTAL HYPOTHESIS OF A CONSTANT CURRENT DENSITY IN THE FILAMENT OF AN OTS IS THE ON STATE IS CORRECT. THIS WAS THE NECESSARY CRITERION FOR DEMONSTRATION OF FEASIBILITY IN ORDER TO PROCEED TO PHASE II. THE WORK DETAILED IN THE PHASE II PROPOSAL WILL DEMONSTRATE THE APPLICABILITY OF THE OTS TO EMP SUPPRESSION BY FABRICATING DISCRETE THIN FILM PROTOTYPE SAMPLES. THESE SAMPLES WILL BE TESTED UNDER SIMILAR CONDITIONS TO THAT SEEN FOR EMP.

EOTEC CORP AF
420 FRONTAGE RD
W HAVEN, CT 06516
M S MAKLAD
TITLE:
DEVELOPMENT OF RADIATION HARD GRADED INDEX OPTICAL FIBE
TOPIC: 171 OFFICE: RADC/XPX

OPTICAL FIBERS ARE BEING CONSIDERED IN THE DESIGN OF MANY MILITARY SYSTEMS BECAUSE OF THEIR NUMEROUS ADVANTAGES. HOWEVER, ALL COMMERCIALLY AVAILABLE FIBERS SHOW TRANSIENT AND PERMANENT INDUCED OPTICAL LOSSES AND, THEREFORE, DO NOT MEET THE NUCLEAR VULNERABILITY REQUIREMENTS OF MANY SYSTEMS. IN PHASE I OF THIS PROGRAM IT WAS PROVEN THAT ARSENIC ADDITIONS UNDER OPTIMIZED CONDITIONS CAN BE USED TO REDUCE THE OPTICAL FIBER RADIATION SENSITIVITY. THIS PROPOSAL OUTLINES THE DETAILED TASKS TO EXPLOIT THIS FINDING; AND THEREFORE, PRODUCE A RADIATION HARD GRADED INDEX OPTICAL FIBER.

EPOLIN INC AF
103 WASHINGTON ST - STE 305
MORRISTOWN, NJ 07960
DR MURRAY S COHEN
TITLE:
USE OF EXPANDING MONOMER COMPOSITIONS FOR AIRCRAFT TRANSPARENCY COATINGS
TOPIC: 45 OFFICE: AFWAL/ML

PHASE I ESTABLISHED THE FEASIBILITY FOR THE DEVELOPMENT OF SUPERIOR OPTICAL COATINGS ON PLASTIC PANELS, NOTABLY POLYCARBONATE. THE SUCCESS OF THIS EFFORT WAS BASED UPON THE USE OF MONOMERIC MATERIALS IN CURED COATING COMPOSITIONS WHICH REDUCE SIGNIFICANTLY THE AMOUNT OF SHRINKAGE THAT NORMALLY OCCURS WHEN STATE-OF-THE-ART COMPOSITIONS ARE

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CURED. DATA FROM PHASE I ARE GIVEN WHICH CONCLUDE THAT THE MOST PROMISING COATINGS WERE BASED ON A DUAL CURE CATIONIC EPOXY SYSTEM WHICH IS INITIATED FIRST BY ULTRAVIOLET LIGHT AND COMPLETED BY THERMAL POST-BAKE. WE CAN MAKE USE OF A PREFORMED SPIROORTHOCARBONATE, NSOC, OR AN IN-SITU FORMED SPIROORTHOESTER AS THE EXPANDING MONOMER. PHASE II WILL COMPLETE THE DEVELOPMENT OF THESE COATINGS. THE BEST PROPERTIES OF STATE-OF-THE-ART COMPOSITIONS WILL BE RETAINED. AT THE SAME TIME IMPROVEMENTS IN ADHESION, IMPACT RESISTANCE AND LOWERED MOISTURE UPTAKE CAN BE GAINED. EVALUATIONS ARE PROPOSED WHICH WILL GIVE QUANTITATIVE EVIDENCE NEEDED FOR COMMERCIAL DEVELOPMENT. AMERICAN OPTICAL CO. HAS AGREED TO PERFORM QUASI-FIELD TESTING TO HELP SHOW WHAT FINAL MODIFICATIONS MUST BE MADE TO THE COATING COMPOSITION.

EPSILON LAMBDA ELECTRONICS CORP AF
427 STEVENS ST
GENEVA, IL 60134
DR PETER P TOULIOS
TITLE:
INTEGRATED W-BAND MONOPULSE RECEIVER
TOPIC: 182 OFFICE: AFATL/ASR

A REQUIREMENT EXISTS FOR HIGH PERFORMANCE, COMPACT, LOW-COST, RELIABLE INTEGRATED MILLIMETER WAVELENGTH TRANSCEIVERS FOR TACTICAL WEAPON SEEKERS. SOME OF THESE SEEKERS REQUIRE A MONOPULSE TYPE TRANSCEIVER OPERATING IN W-BAND. DURING PHASE I A UNIQUE APPROACH TO SATISFYING THIS REQUIREMENT WAS INVESTIGATED WHEREIN THE FEED/ COMPARATOR PART OF THE RECEIVER WOULD BE REALIZED USING DIELECTRIC INSULAR WAVEGUIDE. RESULTS TO DATE VALIDATE BASIC FEASIBILITY OF THIS FEED COMPARATOR BUT ADDITIONAL EFFORT IS REQUIRED TO IMPROVE AND REFINE PERFORMANCE AND TO ESTABLISH PRODUCIBILITY OF THIS DEVICE. THE INITIAL PART OF THE PROPOSED PHASE II PROGRAM WILL ADDRESS THIS REQUIREMENT. THE SECOND PART OF PHASE II WILL DEVELOP AND DEMONSTRATE THE FULLY INTEGRATED W-BAND MONPULSE RECEIVER (LESS LOCAL AND TRANSMITTER OSCILLATOR). PLANAR INTEGRATED CIRCUIT TECHNIQUES WILL INCORPORATE IN A SINGLE MODULE THE CIRCULATOR, THREE BALANCED MIXERS AND THE LOCAL OSCILLATOR POWER DISTRIBUTION NETWORK. A COMPACT CONFIGURATION IS DESCRIBED WHICH WILL ACCOMODATE TO THE FORM FACTOR OF TYPICAL WEAPON APPLICATIONS. THE POSSIBILITY OF A GENERIC TYPE RECEIVER WHICH ADAPTS TO VARIOUS SYSTEM REQUIREMENTS BY ADDING APPLICATION SPECIFIC MODULES IS DESCRIBED.

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ESPRIT TECHNOLOGY INC NAVY
144-A MAYHEW WY
WALNUT CREEK, CA 94596
PHILIP D FLANNER
TITLE:
SMALL SELF CONTAINED AIRCRAFT FATIGUE DATA RECORDER
TOPIC: 127 OFFICE: NAVAIR/NADC

*BECAUSE OF EXTENDED USE OF OLDER AIRFRAMES, INCREASED MISSION REQUIREMENTS SUCH AS MORE SEVERE CATAPULTS AND ARRESTMENTS, AND ADOPTION OF MORE BRITTLE ALLOYS, MONITORING OF FATIGUE DAMAGE ACCUMULATION AT PARTICULAR LOCATIONS ON MILITARY AIRCRAFT HAS BECOME IMPORTANT. WHILE NO SMALL, SELF-CONTAINED DATA RECORDERS FOR USE IN MILITARY ENVIRONMENTS ARE PRESENTLY AVAILABLE, ADVANCES IN LOW-POWER CMOS CIRCUITRY, BATTERY TECHNOLOGY, AND HIGH-DENSITY PACKAGING INDICATE THAT MECHANIZATION OF SUCH A UNIT IS ACHIEVABLE. THE PHASE I FEASIBILITY STUDY WILL INVESTIGATE MEANS FOR INTEGRATING THE LATEST MICROPROCESSOR AND DIGITAL MEMORY TECHNOLOGY WITH OPTIONAL ALGORITHMS, AND VARIOUS SENSORS (ACCELERATION, STRAIN, PRESSURE AND TEMPERATURE). THE PROJECT WILL CULMINATE IN A CONCEPTUAL HARDWARE DESIGN LAYOUT AND PERFORMANCE ANALYSIS OF A RECORDING INSTRUMENT HAVING TARGET SPECIFICATIONS OF: 8 CUBIC INCHES VOLUME, 30 DAYS SELF-POWER, USE WITH INTERNAL OR EXTERNAL TRANSDUCERS, MULTI-CHANNEL OPERATION, 50Hz BANDWIDTH, AND USER CONTROL OF RANGE, DATA EXCLUSIONS, BANDWIDTH AND STORAGE FORMAT.

ESSEX CORP AF
1040 WOODCOCK RD - STE 227
ORLANDO, FL 32803
ROBERT S KENNEDY
TITLE:
DEVELOPMENT OF SACCADE LENGTH INDEX OF TASKLOAD FOR BIOCYBERNETIC APPLICATION
TOPIC: 198 OFFICE: AFOSR/XOT

THE OBJECTIVE IS TO DEVELOP A PSYCHOPHYSIOLOGICALLY BASED INDEX OF HUMAN WORKLOAD. IN PHASE I THE SPATIAL EXTENT OF SPONTANEOUS EYE MOVEMENTS (SACCADES) WAS MEASURED OVER THREE LEVELS OF TASK LOADING (TONE COUNTING COMPLEXITY). THE RESULTS INDICATED THAT THE EXTENT OF SUCH EYE MOVEMENTS VARIED INVERSELY ($p < .001$) AS TASK DEMANDS INCREASED. THIS INDEX APPEARS TO HOLD PROMISE FOR THE DEVELOPMENT OF AN OBJECTIVE INDICATOR OF MENTAL WORKLOAD. IN PHASE II, THREE SEPARATE DEVELOPMENTS WILL BE UNDERTAKEN. THE GENERALITY OF THE

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FINDING OVER A BROAD RANGE OF TASKS, SUBJECTS, AND RECORDING METHODS, WILL BE STUDIED EXPERIMENTALLY IN ORDER TO DETERMINE WHETHER THE METRIC (SACCADE LENGTH INDEX OF TASKLOAD [SLIT]) IS STABLE OVER REPEATED TESTING, FREE OF ARTIFACTS AND RELIABLE ENOUGH TO SERVE AS A PERSONAL SIGNATURE. A META-ANALYSIS OF THE LITERATURE ON INDICANTS OF WORKLOAD IN OPERATIONAL SETTINGS WILL BE USED TO FORMALIZE A FIELD STUDY TO VALIDATE THE METRIC. HARDWARE COMPONENTS WILL BE ACQUIRED AND SOFTWARE WILL BE DEVELOPED SO THAT FULLY "UP-AND-RUNNING" SYSTEMS MAY BE PRODUCED IN PHASE III.

ESSEX CORP AF
1040 WOODCOCK RD - STE 227
ORLANDO, FL 32803
ROBERT S KENNEDY
TITLE:
ISOPERFORMANCE FROM DISPARATE COMBINATIONS OF PRACTICE SELECTION AND EQUIPMENT
TOPIC: 204 OFFICE: AMD/RDO

AN INNOVATIVE PERFORMANCE MEASUREMENT METHODOLOGY IS PROPOSED TO PERMIT MEANINGFUL ANALYSIS OF TEST/EVALUATION CRITERIA FOR MAN/MACHINE COMBINATIONS. THREE AREAS: INDIVIDUAL DIFFERENCES (HUMAN BASIC CAPABILITIES, APTITUDES), PRACTICE EFFECTS (INSTRUCTIONS AND TRAINING) AND CRITERIA FOR HUMAN ENGINEERING OF EQUIPMENT DESIGN WILL BE TREATED AS VARIABLES AND WILL BE SET OFF IN EXPERIMENTAL APPOSITION IN ORDER TO BE STUDIED TOGETHER. A FORMAL ANALYSIS WILL BE DERIVED WHICH WILL PERMIT TRADEOFFS BETWEEN THE RELATIVE CONTRIBUTIONS OF EACH OF THESE AREAS. THE HUMAN FACTORS LITERATURE WILL BE SURVEYED FOR CANDIDATE STUDIES WHERE THE ANALYSIS CAN BE EXERCISED AND TESTED. THEN, AS A MEANS OF DEMONSTRATING THE EFFICIENCY OF SUCH A MODEL, A MULTIFACTOR EXPERIMENT USING A LOW-COST HOME COMPUTER SYSTEM WILL BE PROPOSED. THE TASK WILL BE A MICROPROCESSOR BASED VIDEO GAME REQUIRING PSYCHOMOTOR SKILLS AND DECISION MAKING, AND THE EXPERIMENTAL FACTORS TO BE VARIED WILL INVOLVE EQUIPMENT FEATURES AS WELL AS TASK DIFFICULTY, SUBJECTS AND TRAINING. THE EXPERIMENT WILL BE DESIGNED SUCH THAT THE RELATIVE CONTRIBUTIONS OF ALL THE FACTORS TO PERFORMANCE ON THE TASK CAN BE DETERMINED.

EVANS C & ASSOCS DARPA
1670 S AMPHLETT #120
SAN MATEO, CA 94402
DR DAVID A REED
TITLE:
SPUTTERED NEUTRAL MASS SPECTROMETRY FOR THE QUANTITATIV ANALYSIS OF COMPOUND (AND OTHER) SEMICONDUCTOR MATERIAL
TOPIC: 1 OFFICE: DARPA

COMPOUND SEMICONDUCTORS SUCH AS GaAs, InP, CdTe AND HgCdTe BASED

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ALLOYS WILL HAVE WIDESPREAD USE IN FUTURE DEFENSE RELATED ELECTRONIC SYSTEMS. ALTHOUGH A VARIETY OF SURFACE AND MICROANALYTICAL TECHNIQUES EXIST FOR CHEMICAL CHARACTERIZATION OF THESE MATERIALS, NO TECHNIQUE YET EXISTS FOR QUANTITATIVE MICROSCALE STOICHIOMETRIC ANALYSES. THE RESEARCH PROPOSED FOR PHASE I WILL EVALUATE AND DEVELOP AN APPROACH FOR THE DIRECT MICROCHARACHTERIZATION OF COMPOUND SEMICONDUCTOR STOICHIOMETRY BY SPUTTERED NEUTRAL MASS SPECTROMETRY. UNIQUE TO THIS TECHNIQUE IS THE USE OF ENERGETIC ION SPUTTERING TO INTRODUCE ATOMS INTO A PLASMA FOR ELECTRON IMPACT IONIZATION. THUS, THE ATOMS ARE EXCITED IN A "MATRIX" CONTAINING AN ARGON-BASED PLASMA RATHER THAN IN THE MATERIAL ITSELF, THEREBY CIRCUMVENTING THE WELL-KNOWN "MATRIX EFFECT", WHICH SERIOUSLY COMPLICATES QUANTITATIVE MAJOR CONSTITUENT ANALYSIS. THE GOAL OF PHASE I WILL BE TO DETERMINE THE EFFICACY OF THIS TECHNIQUE. IN ADDITION, WE WILL EXAMINE AND EVALUATE INSTRUMENTAL CONFIGURATIONS AS THEY RELATE TO OTHER DEFENSE RELATED MATERIALS CHARACTERIZATION NEEDS. A SUBSEQUENT PHASE II PROGRAM, IF FUNDED, WOULD BE TO DESIGN, ASSEMBLE, AND EVALUATE AN INSTRUMENTAL CONFIGURATION, WHILE PHASE III WILL CARRY THIS INSTRUMENTATION INTO THE COMMERCIAL MARKETPLACE. IF SNMS MEETS THE STRINGENT DEMANDS FOR STOICHIOMETRIC CHARACTERIZATION, IT WILL CERTAINLY HAVE MANY APPLICATIONS IN OTHER AREAS OF MATERIALS CHARACTERIZATION.

EVAPORATED COATINGS INC ARMY
798 WELSH RD
HUNTINGDON VALLEY, PA 19006
JOHN J WALLS JR
TITLE:
EYE PROTECTION RESEARCH
TOPIC: 96 OFFICE: MED/R&D

STUDIES WILL BE DIRECTED TOWARD PROVIDING A THREE WAVELENGTH REJECTION FILTER. THE SUBSTRATE MATERIAL WILL BE OPHTHALMIC GRADE POLYCARBONATE MATERIAL. A HYBRID REJECTION TECHNIQUE WILL BE INVESTIGATED TO PROVIDE ENHANCED OPTICAL AS WELL AS PHYSICAL PROPERTIES. COMPUTER DESIGN OPTIMIZATION TECHNIQUES WILL BE USED TO YIELD OPTIMAL SPECTRAL PROPERTIES FOR THE HYBRID SYSTEM.

EXTREL CORP ARMY
PO BOX 11512 - 240 ALPHA DR
PITTSBURGH, PA 15238
WADE L FITE
TITLE:
SURFACE IONIZATION DUST DETECTORS TO PROTECT ENGINES OF
AND TACTICAL VEHICLES
TOPIC: 68 OFFICE: TACOM

IN SURFACE IONIZATION DETECTION OF PARTICULATES, A PARTICLE STRIKES

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A HOT (TYPICALLY 900 C) METAL SURFACE OF HIGH WORK FUNCTION, WHERE IT TRANSFERS TO THE SURFACE SOME OF ITS MOLECULAR CONSTITUENTS. CONSTITUENTS WITH IONIZATION POTENTIALS COMPARABLE TO THE WORK FUNCTION ARE EVOLVED AS POSITIVE IONS (USUALLY SODIUM ATOMIC IONS FROM SODIUM COMPOUND IMPURITIES). ARRIVAL OF A PARTICLE AT THE SURFACE CAUSES A BURST OF MANY IONS WHICH ARE DRAWN TO A NEARBY ION COLLECTOR ELECTRODE, PRODUCING A CURRENT PULSE THAT IS RECORDED. PHASE I WORK DEMONSTRATED FEASIBILITY AND SENSITIVITY. PHASE II WORK FURTHER DEVELOPS THE DEVICE THROUGH REFINEMENT OF GEOMETRY, MATERIALS AND CONSTRUCTION OF THE SENSOR IN ORDER TO ACHIEVE LONG OPERATING LIFE-TIME AND ELIMINATE MICROPHONIC NOISE FROM VIBRATION AND SHOCK MINIATURIZATION OF CIRCUITRY.

FIBER MATERIALS INC AF
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
BRIAN MCKILLOP
TITLE:
COMPENDIUM OF REENTRY MATERIAL PROPERTY DATA
TOPIC: 110 OFFICE: AFBMO/PMX

IN PHASE I, PHYSICAL, THERMAL AND MECHANICAL PROPERTIES WERE COMPILED FOR HEATSHIELD MATERIALS. THERMAL ABLATION AND MECHANICAL EROSION CHARACTERISTICS WERE ALSO COLLECTED TO ASSESS RECESSION RATES. THIS DATABASE PROVIDES THE DESIGNER AN EFFICIENT TOOL TO ASSESS THE VARIOUS HEATSHIELD MATERIALS FOR APPLICATION IN ADVANCED REENTRY VEHICLES. THE GOAL IS TO ACCURATELY PREDICT THE RESPONSE OF THERMAL PROTECTION SYSTEMS TO GIVEN AERO-THERMAL/EROSION CONDITIONS TO MAXIMIZE DESIGN MARGIN AND INCREASE PAYLOAD CAPACITY. A PHASE II EFFORT IS PROPOSED THAT WOULD EXTEND THIS WORK TO NOSETIP, ANTENNA WINDOWS, SUBSTRUCTURE AND BOND MATERIALS. A SUBSTANTIAL DATA BASE WOULD BE CREATED FOR EACH OF THESE COMPONENTS WHICH, ALONG WITH THE HEATSHIELD DATA BASE COLLECTED IN PHASE I, WOULD FORM THE FOUNDATION OF A COMPUTERIZED SYSTEM FOR ANALYSIS OF THE THERMAL PROTECTION MATERIALS. IN THIS SYSTEM, THE DATA BASE WOULD BE UTILIZED TO PROVIDE THE NECESSARY INFORMATION TO PREDICT APPROPRIATE CANDIDATE MATERIALS FOR EVALUATION, FLIGHT ENVIRONMENT CONDITIONS, THERMAL/MECHANICAL RESPONSE AND PRELIMINARY THERMAL PROTECTION DESIGN AND WOULD BE WRITTEN FOR IBM PC, PC COMPATIBLE OR PC COMPATIBLE/MAINFRAME SYSTEMS.

FIBER MATERIALS INC AF
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
LOUIS LANDER
TITLE:
CERAMIC/CERAMIC COMPOSITES FOR ADVANCED SOLID ROCKET MO INSULATORS
TOPIC: 210 OFFICE: AFRPL/TSPR

THE RESULTS OF THE PHASE I EFFORT INDICATED THAT CARBON PHENOLIC

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MATERIALS ARE EXTREMELY SENSITIVE TO HEATING RATE VARIATIONS. A SIGNIFICIANT LOSS OF STIFFNESS OCCURS DURING HEATING WHICH CAUSES CARBON PHENOLIC COMPOSITES TO BE THERMALLY UNSTABLE. ALTERNATE MATERIALS WITH INCREASED THERMAL STABILITY COUPLED WITH NON-OUTGASSING CHARACTERISTICS AND HIGHER TEMPERATURE CAPBILITIES HAVE BEEN UNDER DEVELOPMENT. THESE MATERIALS, CERAMIC/CERAMIC COMPOSITES, HAVE BEEN UTILIZED IN PRODUCTION PROGRAMS FOR BOTH ELECTROMAGNETIC TRANSMISSION AND INSULATION. TYPICAL MATERIAL REQUIREMENTS FOR SOLID ROCKET MOTOR (SRM) INSULATION INCLUDE THERMAL STABILITY, LOW THERMAL CONDUCTIVITY, MINIMAL OUTGASSING UNDER RAPID HEATING TO PREVENT PYROLYSIS GAS BUILD-UP IN SEALED SECTIONS, RETENTION OF PROPERTIES AT ELEVATED TEMPERATURES AND ACCEPTABLE EROSION RATES WHERE THE INSULATOR IS EXPOSED TO PROPELLANT COMBUSTION. THE OBJECTIVE OF THE PHASE II EFFORT IS TO FABRICATE AND EVALUATE ADVANCED CERAMIC/CERAMIC COMPOSITES AS SUBSTRATES OR REPLACEMENTS OF REINFORCED ORGANIC MATRIX (CARBON PHENOLIC, SILICA PHENOLIC) INSULATION FOR SRM NOZZLE APPLICATIONS.

FLAM & RUSSELL INC ARMY
PO BOX 444
HORSHAM, PA 19044
R P FLAM
TITLE:
HIGH POWER MILLIMETER WAVE RADIAL COMBINER
TOPIC: 33 OFFICE: LABCOM/ETDL

RADIAL WAVEGUIDE POWER COMBINERS ARE AN EFFICIENT WAY TO COMBINE OUTPUTS FROM MULTIPLE SOLID-STATE MILLIMETER-WAVE AMPLIFIERS. THEIR ADVANTAGES INCLUDE: LOW LOSS, AMPLITUDE AND PHASE BALANCE, LARGE NUMBER OF PORTS, BROAD BANDWIDTH, AND HIGH POWER HANDLING. THEIR MAJOR DISADVANTAGE IS THAT THEY MODE, WHICH CAUSES ISOLIATION PROBLEMS. MODING WILL OCCUR WHEN THE AMPLIFIERS ARE DISSIMILAR OR WHEN FAILURES EXIST UNLESS THE COMBINING STRUCTURE IS PROPERLY DESIGNED. IN ORDER TO PROPERLY DESIGN SUCH A STRUCTURE ONE MUST BE ABLE TO THEORETICALLY PREDICT A COMPLETE SCOLLERLING MATRIX NETWORK DESCRIPTION. THIS DIFFICULT MATHEMATICAL PROBLEM, HERETOFORE UNSOLVED, HAS RECENTLY BEEN SOLVED BY THE STAFF OF FLAM & RUSSELL, INC. (FR). IN SBIR PHASE I FR USED THIS S-MATRIX COMPUTER MODEL IN CONJUNCTION WITH MODELS FOR MILLIMETER-WAVE SOLID-STATE AMPLIFIERS TO DESIGN AND ANALYZE A 44 GHz 16-WAY RADIAL POWER COMBINER SUITABLE FOR COMBINING IMPATT REFLECTION AMPLIFIERS. THIS DESIGN PROMISES TO ACHIEVE SIGNIFICANT IMPROVEMENTS IN LOSS, COST, COMPLEXITY, RELIABILITY, SIZE, AND WEIGHT OVER EXISTING MILLIMETER-WAVE POWER COMBINERS. SIGNIFICANT PHASE I

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RESULTS ARE SUMMARIZED. A DETAILED RESEARCH AND DEVELOPMENT PLAN TO VERIFY THE DESIGN AND ANALYSIS CARRIED OUT IN PHASE I THROUGH THE CONSTRUCTION, TEST, AND EVALUATION OF A BRASSBOARD LABORATORY MODEL POWER COMBINER IS DESCRIBED.

FLOW INDUSTRIES INC ARMY
21414 68TH AVE S
KENT, WA 98032
DR MOHAMED HASHISH
TITLE:
MACHINING OF LIGHTWEIGHT COMPOSITE MATERIALS WITH ABRASIVE WATERJETS
TOPIC: 12 OFFICE: ARDC

NO ABSTRACT AT THIS TIME

FLOW INDUSTRIES INC NAVY
21414 68TH AVE S
KENT, WA 98032
DR G STUART KNOKE
TITLE:
HYDROFOIL PROFILING INSTRUMENT PLATFORM DEVELOPMENT
TOPIC: 3 OFFICE: ONR

*THE DEVELOPMENT OF A HYDROFOIL PROFILING INSTRUMENT PLATFORM FOR MEASURING PHYSICAL, THERMODYNAMIC, GEOCHEMICAL, AND BIOLOGICAL PARAMETERS THROUGHOUT THE WATER COLUMN IS PROPOSED. THE PLATFORM WOULD EMPLOY A LOW-POWER, CONTROLLED HYDRODYNAMIC LIFT DEVICE TO "FLY" THE INSTRUMENT PACKAGE UP AND DOWN THE WATER COLUMN ALONG A TAUT CABLE. BECAUSE LOCAL CURRENTS WILL DRIVE THE PLATFORM, POWER REQUIREMENTS WILL BE LOW AND LONG DEPLOYMENTS WILL BE POSSIBLE. THE OBJECTIVES OF THIS STUDY ARE TO EVALUATE SUCH AN INSTRUMENT PLATFORM FOR OBTAINING LONG-TERM RECORDS OF UPPER OCEAN PARAMETERS AND TO DETERMINE IF THE PLATFORM CAN BE ADAPTED TO RETRIEVE REAL-TIME OCEANOGRAPHIC DATA. DURING PHASE I, THE FEASIBILITY OF THIS PROFILING CONCEPT WILL BE DETERMINED. PHASE I WILL INVOLVE AN ANALYTICAL AND EXPERIMENTAL STUDY OF VARIOUS ASPECTS OF THE PROBLEM: THE DESIGN OF THE HYDROFOIL AND CONTROL SYSTEM, THE EFFECTS OF BIOLOGICAL FOULING AND MARINE CORROSION, AND THE SELECTION OF COMMUNICATION AND DATA HANDLING HARDWARE TO INTERFACE WITH THE ANTICIPATED OCEANOGRAPHIC SENSORS (E.G., SENSORS FOR TEMPERATURE, SALINITY, PRESSURE, TURBIDITY, CURRENT, TURBULENCE, AND SOUND VELOCITY). BASED ON THE RESULTS OF PHASE I, A

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PHASE II RESEARCH AND DEVELOPMENT PROGRAM WILL BE PURSUED WITH THE GOAL OF DEVELOPING A PROTOTYPE HYDROFOIL PROFILING INSTRUMENT PLATFORM.

FLOW INDUSTRIES INC AF
21414 - 68TH AVE S
KENT, WA 98032
JAMES D [illegible] YLE
TITLE:
INTERNAL INSPECTION OF LONG TUBES
TOPIC: 21 OFFICE: AEDC DOT

IN PHASE II, A PROTOTYPE OF THE PROPOSED INSPECTION SYSTEM WILL BE BUILT, LABORATORY TESTED, AND THEN FIELD TESTED AT THE G-RANGE TEST FACILITY, ARNOLD AFB. THIS SYSTEM WILL BE COMPOSED OF THREE PRIMARY COMPONENTS: A REMOTE CONTROLLED PROBE ASSEMBLY, AN INTERFACE UNIT THAT RECEIVES DATA AND TRANSMITS COMMANDS TO THE PROBE, AND A CONTROL CONSOLE FOR OPERATOR INTERFACE. THE PROBE WILL USE LINEAR VARIABLE DIFFERENTIAL TRANSFORMERS AND OPTICAL TRIANGULATION METHODS TO LOCATE FAIL DAMAGE IN THE G-RANGE FACILITY. DEBRIS IN THE TUBE WILL BE LOCATED BY A MINIATURIZED VIDEO CAMERA. A GRINDER HOUSED IN THE PROBE WILL ENABLE THE OPERATOR TO REMOVE SMALL BURRS LOCATED DURING THE INSPECTION. AN OPTICAL TELEMETRY SYSTEM WILL ALLOW THE OPERATOR TO RECEIVE AND VIEW DATA IN NEAR REAL-TIME, ENABLING PRECISE CONTROL OF THE INSPECTION PROCESS.

FLOW RESEARCH CO (FLOW INDUSTRIES INC) DARPA
21414 - 68TH AVE S
KENT, WA 98032
DR JACK KOLLE
TITLE:
DEVELOPMENT OF ELECTROMAGNETIC INDUCTION SEA ICE THICKN
SEA ICE CONDUCTIVITY SENSORS
TOPIC: 9 OFFICE: DARPA

NO ABSTRACT FOR FLOW RESEARCH CO (FLOW INDUSTRIES INC)

FLOW RESEARCH CO (FLOW INDUSTRIES) AF
21414 68TH AVE S
KENT, WA 98032
DR JACK KOLLE
TITLE:
HYDRAULIC EXPLOSIVE TECHNIQUE FOR RAPID EXCAVATION
TOPIC: 106 OFFICE: AFRMO PMX

THE PROPOSED PHASE II PROJECT ADDRESSES THE NEED FOR CONTINUOUS

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HARD ROCK EXCAVATION TECHNIQUES THAT EXPLOIT THE EFFICIENCY AND VERSATILITY OF EXPLOSIVE ROCK FRAGMENTATION WHILE OVERCOMING THE DELAYS AND HAZARDS ASSOCIATED WITH THE USE OF CHEMICAL EXPLOSIVES. THE PHASE I RESULTS DEMONSTRATE THE FEASIBILITY OF USING A HYDRAULIC EXPLOSIVE (HYDREX) TOOL FOR RAPID, ENERGY-EFFICIENT EXCAVATION OF HARD ROCK. THE TOOL WOULD USE THE ENERGY STORED IN A VOLUME OF WATER COMPRESSED TO VERY HIGH PRESSURES TO GENERATE A POWERFUL HYDRAULIC SHOCK WITHIN A CAVITY DRILLED INTO A ROCK FACE. ROCK FRAGMENTATION WITH THE HYDREX SYSTEM SHOULD BE COMPARABLE TO THAT ACHIEVED BY EXPLOSVIE CHARGES WITHOUT THE HAZARDS ASSOCIATED WITH FLY ROCK AND TOXIC FUMES. THE DEVICE WOULD FORM THE BASIS FOR A CONTINUOUS HARD ROCK EXCAVATION SYSTEM SUITABLE FOR RAPID EGRESS FROM A DEEP BASE.

FLUOROCHEM INC AF
680 S AYEN AVE
AZUSA, CA 91702
KURT BAUM
TITLE:
SYNTHESIS OF NEW THERMOOXIDATIVELY STABLE POLYMER SYSTE
TOPIC: 50 OFFICE: AFWAL/ML

*RESEARCH IS PROPOSED ON NEW POLYMER SYSTEMS, WITH HYDROCARBON BACKBONES, CONTAINING ADAMANTANE GROUPS TO PROVIDE HIGH GLASS TRANSITION TEMPERATURES.

FOSTER ENGINEERING CO AF
23241 VENTURA BLVD - STE 309
WOODLAND HILLS, CA 91364
KENNETH FOSTER
TITLE:
TACTICAL WARFARE TECHNOLOGY FOR STRATEGIC WARFARE
TOPIC: 101 OFFICE: AFBMO/PMX

THE FEASIBILITY OF FOUR CONCEPTS DERIVED DURING A PHASE I EFFORT WILL BE INVESTIGATED. FEASIBILITY WILL BE ESTABLISHED BY DEVELOPING PRELIMINARY DESIGNS ALONG WITH WEIGHT ESTIMATES AND PROJECTIONS OF REQUIRED R&D EFFORTS. THE CONCEPTS ARE: 1) DUAL WARHEAD MARV WITH A TERMINAL FIX SYSTEM. THIS WILL ALLOW A FIXED FORCE OF MXS AND SICBMS TO ATTACK UP TO TWICE AS MANY TARGETS; 2) TRUCK-CARRIED MOBILE ICBM FACTORY WHICH CARRIES KEY COMPONENTS (E.G., GUIDANCE SETS) AND FABRICATES BOOSTERS USING INDIGENOUS SOURCES OF ROCKET PROPELLANT

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MATERIALS. THEY WOULD PROVIDE A POST-SIOP FORCE OF SIMPLIFIED SMALL ICBMS WITH ENDURING SURVIVABILITY AND REDUCED ACQUISITION COST; 3) ICBM-DELIVERED DRONE AIRCRAFT. CARRYING SENSORS AND SEVERAL NUCLEAR WEAPONS, SUCH SLOW, LOW FLYING HUNTER-KILLER DRONES WILL SEARCH OUT MOBILE MISSILES WITH A DEGREE OF FLEXIBILITY AND SENSOR UTILIZATION UNATTAINABLE WITH MARVS; 4) COUNTER-EXPLOSIONS FOR SILO DEFENSE. THE TIMELY DETONATION OF CONVENTIONAL EXPLOSIVE CHARGES LOCATED NEAR SILOS WILL REDUCE SIGNIFICANTLY THE EFFECTS OF NUCLEAR BLAST BY CREATING REGIONS OF LOW PRESSURE IN THE PATHS OF BLAST WAVES.

FOSTER-MILLER INC AF
350 SECOND AVE
WALTHAM, MA 02254
RICHARD LUSIGNEA
TITLE:
MICROCOMPOSITE PROCESSING AND APPLICATIONS
TOPIC: 105 OFFICE: AFOSR/XOT

THE PURPOSE OF THE PROPOSED PHASE II PROGRAM IS TO DEMONSTRATE IMPROVED PERFORMANCE IN ENGINEERING STRUCTURES BASED ON THE EXCEPTIONAL MECHANICAL, THERMAL, ELECTRICAL AND CHEMICAL PROPERTIES OF PBT/SOL-GEL GLASS INTERPENETRATING NETWORKS (IPNs). PHASE I DEMONSTRATED THE FEASIBILITY OF SIGNIFICANTLY IMPROVING BIAXIALLY-ORIENTED, PBT FILM PROPERTIES BY INFILTRATION WITH SOL-GEL GLASS REAGENTS, THEREBY PRODUCING PBT/SOL-GEL GLASS MICROCOMPOSITES WHICH WILL MEET EXTREME SERVICE REQUIREMENTS MORE EFFECTIVELY THAN OTHER MATERIALS. THE PHASE II EFFORT WILL ADDRESS THE FOLLOWING: ANALYSIS OF PBT/SOL-GEL GLASS MORPHOLOGY, DEVELOPMENT OF PROCESSES FOR SOL-GEL REAGENT INFILTRATION, LAMINATION AND COATING OF PBT FILMS, AND FABRICATION OF TEST SAMPLES AND PROTOTYPES PARTS TO DEMONSTRATE IMPROVED PERFORMANCE OVER OTHER MATERIALS. SUCCESSFUL RESULTS IN PHASE II WILL ACCELERATE COMMERCIAL DEVELOPMENT OF ORDERED POLYMER/SOL-GEL GLASS MICROCOMPOSITES, BY PROVIDING A DATABASE CONCERNING THEIR EXCEPTIONAL PROPERTIES.

FOSTER-MILLER INC AF
350 SECOND AVE
WALTHAM, MA 02254
ALLAN T FISK
TITLE:
INTEGRATED DRILL-LOAD-SHOOT EXCAVATION SYSTEM
TOPIC: 106 OFFICE: AFBMO/PMX

THE INTEGRATED-DRILL-LOAD-SHOOT (IDLS) CONCEPT IS A CONTINUOUS DRILL

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AND BLAST ROCK EXCAVATION METHOD BASED ON THE USE OF SMALL BLASTS COMPRISED OF SINGLE BLASTHOLES OF NOMINALLY CONVENTIONAL DIAMETER AND DEPTH, ALL SLABBING TO A SUSTAINED FREE FACE. THE USE OF SMALLER, BUT REPETITIVE SEQUENTIAL SHOTS PERMITS NEARLY CONTINUOUS, RATHER THAN FULL-FACE-CYCLIC OPERATION OF THE EXCAVATION PROCESS. LOADING AND INITIATION (SHOOTING) IS ACCOMPLISHED IN EACH HOLE AS THE DRILL IS RETRACTED FROM THE BLASTHOLE AT THE CONCLUSION OF DRILLING. THE IDLS SUBSYSTEM EMPLOYS RELATIVELY CONVENTIONAL DRILLING HARDWARE AS WELL AS INEXPENSIVE BULK EXPLOSIVES, IS SIMPLE MECHANICALLY, AND IS EASILY AUTOMATED OR REMOTELY CONTROLLED. SHIELDING REQUIREMENTS ARE MINIMAL DUE TO THE INHERENT GEOMETRY OF THE SYSTEM, AND OPERATIONAL FLEXIBILITY PERMITS THE BLAST DESIGN TO VARY IN RESPONSE TO GEOLOGIC CONDITIONS. HOST ROCK DAMAGE IS MINIMIZED DUE TO THE SMALL SIZE OF THE INDIVIDUAL BLASTS, AND EXCAVATION GEOMETRY IS HIGHLY FLEXIBLE. DURING PHASE I THE BASIC STEPS OF AUTOMATICALLY LOADING BOTH THE EXPLOSIVE AND THE DETONATOR INTO THE BLASTHOLE WERE DEMONSTRATED USING CONVENTIONAL DRILLING COMPONENTS. THE PHASE II EFFORT WILL, AMONG OTHER THINGS, BUILD AND TEST AN ENTIRE, FULL SIZE IDLS SUBSYSTEM, OPERATING UNDER REMOTE CONTROL IN REPRESENTATIVE ROCK STRATA.

FOSTER-MILLER INC AF
350 SECOND AVE
WALTHAM, MA 02254
J BOYCE
TITLE:
TRANS-LAMINAR REINFORCEMENT OF ORGANIC MATRIX COMPOSITE
TOPIC: 40 OFFICE: AFWAL/FI

COMPOSITE LAMINATES MADE FROM CONVENTIONAL EPOXY PREPREGS ARE PRONE TO DELAMINATION DUE TO IMPACT OR EDGE EFFECTS. SOME MEANS OF IMPROVING COMPRESSIVE STRENGTH AFTER IMPACT IS DESIRED. STITCHING IS ONE OPTION, BUT CAUSES DAMAGE TO IN-PLANE PROPERTIES (STRENGTH, MODULUS). A PHASE I PROGRAM WAS PERFORMED TO INVESTIGATE A TECHNIQUE WHICH UTILIZES REINFORCED PLASTIC STAPLES TO CONTROL DELAMINATION. DAMAGE TO IN-PLANE REINFORCEMENTS WAS MINIMIZED BY ULTRASONIC VIBRATION OF THE LAMINATE PRIOR TO STAPLING. STAPLED LAMINATES SHOWED A 55 PERCENT REDUCTION IN IMPACT DAMAGE RELATIVE TO UNSTAPLED SPECIMENS. IN-PLANE PROPERTIES FOR UNIMPACTED SPECIMENS SHOWED 17 PERCENT REDUCTION AS COMPARED TO APPROXIMATELY 25 PERCENT FOR STITCHED LAMINATES. A PHASE II PROGRAM IS PROPOSED TO DEVELOP A PREPRODUCTION PROTOTYPE ULTRASONIC STAPLING DEVICE. ADDITIONAL TEST SPECIMENTS

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WILL BE PREPARED USING DIFFERENT MATERIALS, STAPLE PATTERNS, AND LAMINATE CONSTRUCTIONS. SPECIMENS WILL BE TESTED FOR IMPACT, COMPRESSION AFTER IMPACT, DOUBLE CANTILEVER BEAM, AND IN-PLANE TENSILE AND COMPRESSION PROPERTIES. INITIAL DEMONSTRATION COMPONENTS WILL BE IDENTIFIED, FABRICATED, AND EVALUATED RELATIVE TO CURRENT MATERIAL SYSTEMS.

FOSTER-MILLER INC AF
350 SECOND AVE
WALTHAM, MA 02254
RICHARD W LUSIGNEA
TITLE:
ORDERED POLYMER FILM MULTILAYER BOARDS FOR HIGH DENSITY ELECTRONIC PACKAGING
TOPIC: 57 OFFICE: AFWAL/ML

ORDERED POLYMER FILMS WILL PROVIDE MAJOR IMPROVEMENTS IN NEW HIGH DENSITY ELECTRONIC PACKAGING. THE PHASE I PROGRAM SHOWED THAT POLYBENZTHIAZOLE (PBT) FILMS MEET THE PRIMARY REQUIREMENTS OF: CONTROLLABLE COEFFICIENT OF THERMAL EXPANSION (CTE) TO MATCH LEADLESS CERAMIC CHIP CARRIERS, LOW DIELECTRIC CONSTANT AND DISSIPATION FACTOR, ABILITY TO PLATE COPPER LAYERS, AND ABILITY TO BOND MULTIPLE LAYERS. PBT FILMS CAN SOLVE MANY OF THE PROBLEMS FACING DIRECT SURFACE MOUNTING (DSM) OF LEADLESS PERIMETER AND GRID ARRAY PACKAGES INCLUDING THERMAL CYCLE SOLDER FATIGUE, MICROCRACKING, AND DIMENSIONAL STABILITY DURING MANUFACTURING. THE PROPOSED PHASE II PROGRAM WILL INVOLVE MATERIAL CHARACTERIZATION, DESIGN, FABRICATION AND TESTING OF PROTOTYPES AND TEST SAMPLE BOARDS DEMONSTRATING THE CAPABILITIES OF ORDERED POLYMER FILMS FOR SUBSTRATES TO BE USED IN VHSIC AND VLSIC APPLICATIONS.

FUSION SYSTEMS CORP ARMY
7600 STANDISH PL
ROCKVILLE, MD 20855
MICHAEL G URY
TITLE:
UV-ENHANCED MPVE PROCESS FOR LOW TEMPERATURE HgCdTe EPI
TOPIC: 42 OFFICE: CECOM/NVEO

NO ABSTRACT FOR FUSION SYSTEMS CORP

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GAERTNER W W RESEARCH INC AF
205 SADDLE HILL RD
STAMFORD, CT 06903
DR W W GAERTNER
TITLE:
(AI)2 REAL-TIME PILOT AID SYSTEM
TOPIC: 20 OFFICE: AFWAL/AA

REAL-TIME EXECUTION OF AI ALGORITHMS IS NOT POSSIBLE ON CONVENTIONAL AI COMPUTERS. UNDER AN EARLIER CONTRACT W. W. GAERTNER RESEARCH, INC. HAS DEVELOPED THE (AI)2 - ARTIFICIAL INTELLIGENCE AND ARTIFICIAL INSTINCT - ARCHITECTURE WHICH COMBINES TRADITIONAL AI PROCEDURES WITH A VERY FAST AND SOPHISTICATED DATABASE LOOKUP CAPABILITY IN SPECIAL HARDWARE, TO ACHIEVE THE MUCH SHORTER RESPONSE TIME NEEDED FOR "REAL TIME". IT HAS BEEN PROPOSED TO ADAPT THIS ARCHITECTURE TO THE PILOT AID APPLICATION AND TO INJECT THE USE OF STATISTICAL CONCEPTS (INITIALLY BAYESIAN DECISION ANALYSIS) TO ADDRESS THE PROBLEM OF INCOMPLETE AND CONTRADICTORY DATA. UNDER PHASE I, THE (AI)2 CONCEPT HAS BEEN EXPANDED FURTHER TO ALLOW FOR REAL-TIME EXECUTION OF CERTAIN FREQUENCY USED AI OPERATIONS AND TO ALLOW THE HANDLING OF UNCERTAINTY AND INCONSISTENCY, BOTH IN ADDITIONAL PROPRIETARY CUSTOM HARDWARE. FOR PHASE II IT IS NOW PROPOSED TO DESIGN AND BUILD AN (AI)2 DEVELOPMENT WORK STATIONS, AND TO DEMONSTRATE ITS USEFULNESS VIA SEVERAL EXAMPLES IN TACTICS, AIRCREW SAFETY AND PILOT DEPENDENCE OF DECISION PROCESSES.

GENERAL TECHNOLOGY INC NAVY
12903 AUTUMN DR
SILVER SPRING, MD 20904
S C LING
TITLE:
ADVANCED MICROCONDUCTIVITY PROBE FOR OCEANIC USE DEVELO
TOPIC: 124 OFFICE: NWSC

*A NEW HIGH-FREQUENCY, NONFOULING, FOUR-ELECTRODE, OPEN-CELL CONDUCTIVITY SENSOP FOR OCEANIC USE IS PROPOSED. THIS SENSOR IS TO REPLACE THE COMMONLY USED CONDUCTIVITY CELL MADE BY N. BROWN INSTRUMENT ESYSTEM. THE NEW SENSOR WILL BE DESIGNED TO MINIMIZE OR ELIMINATE PROBLEMS ASSOCIATED WITH N. BROWN CONDUCTICITY CELL. SOME STRINGENT DESIGN CRITERIA ARE SET FOR THE NEW CONDUCTIVITY SENSOR: 1. THE SENSOR SHOULD BE NONFOULING FOR OCEANIC USE. 2. IT SHOULD BE COMPATIBLE TO THE EXISTING NEIL BROWN ELECTRONICS. 3. AN OPEN-CELL, FOUR-ELECTRODE TYPE IS HIGHLY DESIRABLE. 4. IT SHOULD HAVE A SPATIAL RE-

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SOLUTION OF 0.5 cm OR LESS. 5. IT SHOULD POSSESS AN UNBIASED HIGH-FREQUENCY RESPONSE OF AT LEAST 500 HERTZ. 6. IT SHOULD BE FREE FROM CONDUCTIVITY FILM EFFECT OR BOUNDARY-LAYER FLOW EFFECT. A PRELIMINARY INVESTIGATION HAS SHOWN THAT THE ABOVE CRITERIA CAN BE FULFILLED BY THE PROPOSED NEW CONDUCTIVITY SENSOR.

GEO-CENTERS INC ARMY
320 NEEDHAM ST
NEWTON UPP FALLS, MA 02164
EDWARD D PETROW
TITLE:
MICRO-MINIATURE ROLL RATE SENSOR
TOPIC: 1 OFFICE: ARDC

ADVANCED DEVELOPMENT OF THE UNIQUE ADVANTAGES AND CAPABILITIES OF A MICRO-MINIATURE FIBER OPTIC ROLL RATE SENSOR BASED ON STRESS-INDUCED BIREFRINGENCE FOR SPECIFIC APPLICATION IN GUIDED, SMART MUNITIONS SUCH AS THE COPPERHEAD, IS PROPOSED. THE PROOF-OF-PRINCIPLE EXPERIMENTS COMPLETED DURING THE PHASE I EFFORT HAVE DEMONSTRATED THE VIABILITY OF THE BASIC APPROACH AT RATES OF ROTATION BETWEEN 0 AND 360 DEGREES PER SECOND WITH A HIGH DEGREE OF ACCURACY AND LINEARITY. IN ADDITION TO INSENSITIVITY TO RF INTERFERENCE, HIGH DATA RATES, LONG AND UNAMPLIFIED DATA TRANSMISSION, NO MOVING PARTS, AND WIDE APPLICABILITY, ETC., SENSORS BASED ON THIS SIMPLE DESIGN AFFORT TREMENDOUS OPPORTUNITY FOR MINIATURIZATION AND REDUCTION COST OF MANUFACTURE.

GINER INC ARMY
14 SPRING ST
WALTHAM, MA 02154
DR VINOD JALAN
TITLE:
COMPACT REGENERABLE SULFUR SCRUBBER FOR PHOSPHORIC ACID CELLS
TOPIC: 54 OFFICE: BRDC

A BENCH SCALE TEST PROGRAM IS PROPOSED TO EVALUATE USE OF CuO/ZnO DESULFURIZATION SORBENTS FOR HOT REGENERABLE SULFUR REMOVAL FROM LOGISTIC HYDROCARBON FUELS IN PORTABLE PHOSPHORIC ACID FUEL CELL POWER PLANTS. AN EFFICIENT REGENRABLE DESULFURIZATION PROCESS OPERATING WITHIN THE TEMPERATURE RANGE OF 450 TO 650 DEG C WILL REDUCE THE WEIGHT AND VOLUME OF THE PRESENT SULFUR REMOVAL UNITS AND

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WILL PROVIDE CONSIDERABLE FLEXIBILITY IN FUEL PROCESSING. PHASE I CLEARLY ESTABLISHED THE FEASIBILITY OF DESULFURIZATION OF REFORMED FUELS OVER CuO/ZnO SORBENT AND THE REGENERABILITY (WITH AIR) OF THE SORBENT. AN ENCOURAGING EXTENSION OF THIS WORK, A POTENTIALLY PATENTABLE CONCEPT, MAY PROVIDE A BREAKTHROUGH IN FUEL PROCESSING TECHNOLOGY FOR FUEL CELLS.

GINER INC ARMY
14 SPRING ST
WALTHAM, MA 02154
DR VINOD JALAN
TITLE:
ELECTROCHEMICAL HYDROGEN CONCENTRATOR FOR PHOSPHORIC AC FUEL CELLS
TOPIC: 55 OFFICE: BRDC

AN ELECTROCHEMICAL METHOD IS PROPOSED FOR THE SEPARATION OF HYDROGEN FROM A HIGH CARBON MONOXIDE AND HYDROGEN SULFIDE CONTENT REFORMED FUEL-GAS STREAM FOR DIRECT FEED INTO A FIELD PORTABLE PHOSPHORIC ACID FUEL CELL USED BY THE U.S. ARMY. THIS ELECTROCHEMICAL HYDROGEN SEPARATOR (EHS) IS BASED ON CURRENT PHOSPHORIC ACID FUEL CELL TECHNOLOGY. IN IT HYDROGEN WOULD BE REMOVED FROM A REFORMED FUEL GAS STREAM BY OXIDATION AT A GAS DIFFUSION ANODE AND REGENERATED AT AN OPPOSING GAS DIFFUSION CATHODE. THIS DEVICE HAS BEEN DEMONSTRATED WITH TWO POTENTIALLY PATENTABLE CONCEPTS, TO PRODUCE HIGH PURITY HYDOGEN WHILE TOLERATING LARGE AMOUNTS OF CARBON MONOXIDE AND HYDOGEN SULFIDE. GINER, INC. PROPOSES TO EVALUATE THE EHS IN THE LABORATORY UNDER THE CONDITIONS OF THE STATED APPLICATION AND TO EXPLOIT IT ESPECIALLY FOR EDDUCING THE SIZE AND WEIGHT OF THE PORTABLE POWER PLANT. STUDIES WILL BE CONDUCTED WITH DIFFERENT ELECTOCHEMICAL CATALYSTS AND DIFFERENT ELECTRODE FORMULATIONS TO IMPROVE EHS PERFORMANCE AND TO INTEGRATE THE EHS INTO THE FUEL PROCESSING TRAIN.

GROSS T.A.O. INC NAVY
230 CONCORD RD
LINCOLN, MA 01773
T.A.O. GROSS
TITLE:
EDDY CURRENT INSPECTION OF GRAPHITE-EPOXY COMPOSITES
TOPIC: 99 OFFICE: NSWC

*THE STRUCTURAL INTEGRITY OF GRAPHITE-EPOXY COMPOSITES CAN BE VALI-

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DATED BY MEASUREMENT OF EDDY-CURRENTS INDUCED IN ELECTRICALLY CONDUCTING FIBERS. EDDY-CURRENTS ARE DIMISHED IN DAMAGE REGIONS OF A COMPOSITE STRUCTURE BECAUSE RUPTURED FIBERS DO NOT PROVIDE AN ELECTRICALLY CONDUCTING PATH. THE PROGRAM PROPOSED HEREIN SEEKS SOLUTIONS TO PRACTICAL PROBLEMS AND OBSTACLES TO THE REALIZATION OF A PRACTICAL INSTRUMENT FOR INSPECTION IN THE FIELDS.

GT-DEVICES INC SDIO
5705 GENERAL WASHINGTON DR
ALEXANDRIA, VA 22312
RODNEY L BURTON
TITLE:
CERAMIC INSULATORS FOR PULSED ELECTROTHERMAL DISCHARGES
TOPIC: 18 OFFICE: IST

NO ABSTRACT FOR GT-DEVICES INC

GULF WEATHER CORP ARMY
136 ESPY AVE
BAY ST LOUIS, MS 39571
F J SCHATZLE
TITLE:
HEAT STRESS WEATHER NETWORK
TOPIC: 95 OFFICE: MED FT. DET

THE PURPOSE OF THIS WORK WAS TO DEMONSTRATE THAT THE COMPONENTS OF THE WBGI INDEX (WEB BULB, DRY BULB AND BLACK GLOBE TEMPERATURE) CAN BE DERIVED FROM SATELLITE DATA. THE WORK CONSISTED OF FIELD OBSERVATIONS (SURFACE AND UPPER AIR) TAKEN AT VARIOUS LOCATIONS (HOT/DRY, HOT/HUMID) TO CORRESPOND WITH SATELLITE PASSAGES. THE SPONSOR PROVIDED ADDITIONAL WBGT DATA FROM OTHER AREAS OF THE WORLD. SATELLITE DATA COINCIDENT TO FIELD AND SPONSOR PROVIDED DATA WERE OBTAINED FROM NESDIS. SATELLITE DATA WERE COMPUTER PROCESSED AT SCRIPPS INSTITUTE AND COMPARED WITH THE IN SITU DATA. ALGORITHMS WERE DEVELOPED THAT RELATED EARTH'S SURFACE SKIN TEMPERATURE TO THE DRY BULB TEMPERATURE, AND TOTAL PRECIPITABLE WATER TO THE WET BULB TEMPERATURE. METHODOLOGY IS PROPOSED FOR PROVIDING SURFACE WINDS AND IMPROVED ALBEDO MEASUREMENT FROM SATELLITES AS INPUT TO AN EXISTING USARIEM PROGRAM FOR DETERMINING BLACK GLOBE TEMPERATURE. FOLLOWING ARE THE RESULTS OF THE RESEARCH: DRY BULB TEMPERATURE IS LINEARLY RELATED, DURING DAYTIME, TO EARTH'S SKIN TEMPERATURE, AVAILABLE FROM SATELLITE. WET BULB TEMPERATURE IS CORRELATED WITH THE LOGARITHMIC OF THE TOTAL PRECIPI-

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TABLE WATER AVAILABLE FROM SATELLITES. AN EQUATION WAS DERIVED FOR COMPUTATION OF SURFACE WINDS FROM SATELLITE OR WEATHER MAP DATA FOR USE WITH THE SPONSORS BLACK GLOBE TEMPERTURE PROGRAM.

GUMBS ASSOCS INC ARMY
26 AVENUE B
NEWARK, NJ 07114
DR RONALD W GUMBS
TITLE:
EYE PROTECTION RESEARCH
TOPIC: 96 OFFICE: MED/R&D

DURING PHASE I, THE APPLICATION OF CONDUCTING POLYMERS SUCH AS POLY-PYRROLE AS A SWITCHABLE FILTER MATERIAL FOR PROTECTION AGAINST THREATS FROM LOW TO MEDIUM ENERGY LASERS WAS INVESTIGATED. AS A PART OF THE INITIAL CONCEPT FEASIBILITY EVALUATION PROCESS, THE FOLLOWING WAS SUCCESSFULLY DEMONSTRATED: 1) SYNTHESIS OF POLYPYRROLIUM TOLUENE SULFONATE IN THIN FILM FORM VIA ELECTROCHEMICAL POLYMERIZATION IN A NON-AQUEOUS MEDIUM; 2) ELECTROCHEMICAL CYCLING OF THIS CONDUCTING POLYMER IN THIN FILM FORM; 3) ELECTROCHEMICAL AND OPTICAL CHARACTERI-ZATION OF THE OXIDIZED AS WELL AS THE REDUCED STATE IN ORDER TO EVALUATE THE SWITCHING EFFECTIVENESS AND EFFICIENCY; AND 4) FABRICA-TION OF MULTILAYER DEVICES WHICH FUNCTION AS SWITCHABLE LASER FILTERS. BASED ON THESE RESULTS, A FOLLOW ON PROGRAM WHICH CAN BRING THESE MATERIALS TO FIELD TRIALS AND ACTUAL APPLICATION IS PROPOSED. SPECIFIC TECHNICAL OBJECTIVES OF THE PHASE II EFFORT ARE: 1) OPTI-MIZE THE COMPOSITION OF THE LASER SWITCHING MATERIALS, AND THE DESIGN OF THE DEVICE FOR THE NECESSARY LEVEL OF EYE PROTECTION, FOLLOWING PHASE I RESULTS; 2) DEVELOP TECHNIQUES TO PREPARE LARGE AREA POLY-PYRROLE FILMS OF UNIFORM THICKNESS, AND INCORPORATE THEM IN LARGE AREA DEVICES; 3) PERFORM SWITCHING TESTS ON THESE LARGE AREA DEVICES; 4) CONDUCT ACCELERATED TESTS TO DETERMINE ENVIRONMENTAL STABILITY; AND 5) CONTINUE A RESEARCH AND DEVELOPMENT PROGRAM AIMED AT DEVELOP-ING NEW IMPROVED POLYMERS, AND EVALUATING OPTICAL SWITCHING IN ORDER TO DEVELOP PASSIVELY SWITCHING SYSTEMS WITH GIGAHERTZ RESPONSE. ANTICIPATED RESULTS/POTENTIAL COMMERCIAL APPLICATIONS OF THE RESEARCH-THE PROPOSED WORK, IF SUCCESSFUL, WILL LEAD TO THE DEVELOPMENT OF A NEW CLASS OF LASER BLOCKING MATERIALS AND STRUCTURES. THE PROPOSED APPLICATION IS SUITABLE FOR EXPENSIVE EQUIPMENT AND SPECIALIST PER-SONNEL, E.G., HELICOPTER AND TANK CREWS.

SUBMITTED BY DEPT

GUPTA P K INC AF
117 SOUTHBURY RD
CLIFTON PARK, NY 12065
DR PRADEEP K GUPTA
TITLE:
TRACTION MODELING OF MILITARY LUBRICANTS
TOPIC: 69 OFFICE: AFWAL/PO

AFTER DEMONSTRATING THE FEASIBILITY OF AN APPROACH TO THE DEVELOPMENT OF TRACTION MODELS FOR MILITARY LUBRICANTS, IN PHASE I, ENHANCEMENTS OF THE CURRENT MODELS ARE PROPOSED, IN PHASE II, TO PERMIT A REALISTIC TREATMENT OF NON-NEWTONIAN BEHAVIOR, THERMAL EFFECTS IN LUBRICANT FILMS, AND SURFACE ROUGHNESS EFFECTS UNDER EXTREME CONDITIONS OF OPERATION. THE DEVELOPMENT APPROACH CONSISTS OF THE DERIVATION OF SIGNIFICANT CONSTITUTIVE COEFFICIENTS FROM CORRELATIONS OF THE PREDICTED BEHAVIOR TO EXPERIMENTAL TRACTION DATA. THE PROPOSED EFFORT CONSISTS OF ANALYTICAL FORMULATION OF MODEL REFINEMENTS, DEVELOPMENT OF NECESSARY COMPUTER CODES, EXPERIMENTAL VALIDATION, INCORPORATION OF THE MODEL IN A BEARING DYNAMICS COMPUTER PROGRAM AND SIMULATION OF ROLLING BEARING AS A FUNCTION OF LUBRICANT BEHAVIOR. THE PREDICTIVE STRENGTHS OF THE MODELS OVER EXTENDED RANGE OF OPERATING CONDITIONS SHALL BE PROVEN BY EXPERIMENTAL VALIDATION BOTH IN TERMS OF PREDICTION OF TRACTION IN AN INDIVIDUAL CONTACT AND OVERALL PERFORMANCE OF A ROLLING BEARING. ASIDE FROM ENHANCEMENT OF THE CURRENT UNDERSTANDING OF RHEOLOGICAL BEHAVIOR OF LUBRICANTS IN CONCENTRATED CONTACTS, THE PROPOSED EFFORT SHALL RESULT IN COMPUTER CODES WHICH MAY HAVE SIGNIFICANT POTENTIAL FOR THE DESIGN OF MECHANICAL COMPONENTS AND LUBRICANT DEVELOPMENT.

HITTITE MICROWAVE CORP AF
5 INGLESIDE RD
LEXINGTON, MA 01730
YALCIN AYASLI
TITLE:
MONOLITHIC GaAs FET-BASED MICROWAVE SIGNAL-CONTROL COMP
TOPIC: 168 OFFICE: RADC/XPX

MICROWAVE SIGNAL-CONTROL COMPONENTS ARE REQUIRED FOR VARIOUS COMMERCIAL AND MILITARY APPLICATIONS. THE ESTABLISHED SWITCH ELEMENT GENERALLY USED FOR THIS PURPOSE IS THE SILICON PIN DIODE. THE PROPOSED PHASE II EFFORT IS DIRECTED TOWARD DEVELOPING AN ALTERNATIVE TECHNOLOGY BASED ON MONOLITHIC GaAs FIELD-EFFECT TRANSISTORS. THE PHASE I STUDY INVESTIGATED THE FUNDAMENTAL LIMITS OF DEVICE AND CIR-

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CUIT CONCEPTS FOR OPTIMUM SWITCHING AND POWER-HANDLING PROPERTIES AND DEMONSTRATED THE FEASIBILITY OF OPERATION UP TO SIGNIFICANT RF POWER LEVELS. TO ESTABLISH THE RANGE OF APPLICABILITY OF THESE CONCEPTS, THIS PROPOSAL OUTLINES AN APPROACH FOR A 4-BIT PHASE SHIFTER AT X-BAND THAT WOULD FIT INTO AN AREA OF 50 x 50 MILS AND AN SPST SWITCH THAT CAN HANDLE 50 W CW WITH NO DEGRADATION IN PERFORMANCE AND THAT STAYS MATCHED TO 50 OHMS IN EITHER STATE. THESE COMPONENTS SERVE ONLY AS AN EXAMPLE AND THE TECHNIQUES USED IN THEIR DEVELOPMENT WILL ESTABLISH A GENERAL TECHNOLOGY BASE TO SERVE THE NEEDS OF THE CONTROL COMPONENTS MARKET.

HOKENSON CO ARMY
840 S TREMAINE AVE
LOS ANGELES, CA 90005
DR GUSTAVE J HOKENSON
TITLE:
NUMERICAL SIMULATION AND OPTIMIZATION OF LIQUID PROPELL GUNS
TOPIC: 6 OFFICE: ARDC

THE PROPOSED WORK INVOLVES THE DEVELOPMENT OF A COMPREHENSIVE THEORETICAL FORMULATION AND NUMERICAL SIMULATION OF LIQUID PROPELLANT GUNS. IN ADDITION, UTILIZING SUCH NUMERICAL CODES, THE RESEARCH ENTAILS CARRYING OUT AN EXHAUSTIVE COMPUTATIONAL STUDY OF THE PERFORMANCE AND STABILITY OF GUNS WHICH EMPLOY VISCO-ELASTIC PROPELLANTS. AS A RESULT OF THIS COMPUTATIONAL EFFORT, THE EFFECT ON GUN PERFORMANCE AND STABILITY OF ALL DIMENSIONLESS GROUPS WHICH CHARACTERIZE THE MEDIUM/FLOWFIELD, SYSTEM GEOMETRY AND OPERATIONAL LOGIC SHALL BE THOROUGHLY QUANTIFIED. UTILIZING AVAILABLE EXPERIMENTAL DATA, THESE COMPREHENSIVE NUMERICAL SIMULATION TOOLS AND METHODOLOGY SHALL BE VALIDATED AND TRANFERRED TO THE U.S. ARMY FOR APPLICATION TO THE DESIGN AND DEVELOPMENT OF LIQUID PROPELLANT GUNS. A COMPLETE SET OF MANUALS DETAILING THE USE OF THE NUMERICAL TOOLS AND THEIR THEORETICAL BACKGROUND SHALL ALSO BE PROVIDED.

HYPRES INC AF
175 CLEARBROOK RD
ELMSFORD, NY 10523
DR STEPHEN WHITELEY
TITLE:
SUPERCONDUCTING MILLIMETER WAVE COMPONENTS
TOPIC: 196 OFFICE: AFOSR/XOT

AS THE PIONEER AND LEADER IN HIGH PERFORMANCE DEVICE AND SYSTEM

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DEVELOPMENT, HYPRES PLANS TO APPLY ITS UNIQUE, PROPRIETARY SUPERCONDUCTING TECHNOLOGIES AND FURTHER ADVANCE THE STATE-OF-THE-ART IN MILLIMETER WAVE APPLICATIONS. SPECIFICALLY, HYPRES PROPOSES AS A PHASE II EFFORT TO ADDRESS THE EMERGING NEEDS OF DOD's ADVANCED MILITARY ELECTRONICS APPLICATIONS BY BUILDING A COMPLETE SUPERCONDUCTOR-INSULATOR-SUPERCONDUCTOR (SIS) MIXER AND LOW NOISE AMPLIFIER SYSTEM INTENDED TO OPERATE UP TO 95 GHz AND WITH NOISE TEMPERATURES AS LOW AS 10K. BASED ON THE EXTREMELY LOW NOISE AND HIGHLY NONLINEAR CURRENT VOLTAGE CHARACTERISTICS OF SIS DEVICES, THE PERFORMANCE OF THE PROPOSED SYSTEM INCLUDING AMPLIFIERS CANNOT BE MATCHED BY OTHER NON-SUPERCONDUCTING TECHNOLOGIES. HYPRES' EXPERTISE IN THIS AREA STEMS FROM ITS ONGOING COMMERCIAL DEVELOPMENT OF SUPERCONDUCTING ELECTRONIC DEVICES AND FROM ITS DEVELOPMENT UNDER AN EARLIER CONTRACT OF SIS MIXER DEVICES FOR THE NAVAL RESEARCH LABORATORY. ENCOURAGING RESULTS FROM THESE DEVELOPMENTS HAVE LED TO FURTHER DEVICE OPTIMIZATIONS AND SIS MIXER CIRCUIT DESIGNS AS PART OF PHASE I OF THIS CONTRACT. IN PHASE II, HYPRES PROPOSES TO DEVELOP A COMPLETE SIS MIXER SYSTEM COMPRISED OF OUR OWN FABRICATED SUPERCONDUCTING ICs (INCLUDING A LINEAR ARRAY OF SIS MIXERS, REACTIVE TUNING ELEMENT, AMPLIFIER, STRIPLINES, ETC.) AND CRYOGENIC PACKAGING SCHEMES ALONG WITH THE COMPANY'S PROPRIETARY, WIDE BANDWIDTH INTERFACES FOR COUPLING ROOM TEMPERATURE SIGNALS TO CRYOGENIC ENVIRONMENTS. IN ADDITION, VARIOUS TUNING SCHEMES WILL BE STUDIED TO ALLEVIATE SOME OF THE IMPEDANCE MATCHING PROBLEMS. FINALLY, THE APPLICATION OF NIOBIUM-NITRIDE (NbN) TECHNOLOGY WILL BE EXPLORED IN AN ATTEMPT TO REDUCE THE REFRIGERATION REQUIREMENTS, IMPROVE RELIABILITY AND REDUCE COSTS FOR FUTURE DESIGNS. THE ULTIMATE GOAL IS TO USE INEXPENSIVE, COMPACT, CLOSED CYCLE REFRIGERATORS.

I K E ASSOCS INC ARMY
10815 MAZE RD
INDIANAPOLIS, IN 46259
B I RUPE
TITLE:
DEVELOPMENT OF TEST METHODS FOR THE ELECTROSTATIC PROPE
OF NON-HOMOGENEOUS FABBRICS
TOPIC: 83 OFFICE: NRDC

THIS IS PHASE II OF A PROJECT COMMENCED ON 1 JULY 1985 TO DEVELOP TEST METHODS AND EQUIPMENT NEEDED TO DETERMINE THE ELECTROSTATIC PROPERTIES OF TEXTILES IN WHICH A SMALL PERCENTAGE OF THE TOTAL CONSISTS OF CONDUCTIVE FILAMENTS. THESE FABRICS ARE INTENDED FOR USE

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IN THE MANUFACTURE OF GARMENTS TO BE WORN IN EXPLOSIVE ENVIRONMENTS AND OTHER AREAS WHERE THE ACCUMULATION OF STATIC CHARGES MUST BE MINIMIZED. EXISTING COMMERCIALLY AVAILABLE TEST EQUIPMENT HAS BEEN MODIFIED TO MAKE POSSIBLE THE MEASUREMENT OF E-FIELD SUPPRESSION OFFERED BY THE CONDUCTIVE FILAMENTS AS WELL AS THE CHARGE DECAY RATE OF THE RELATIVELY NONCONDUCTIVE CONTENT OF THE FABRIC. A TRIBO-ELECTRIC TEST FIXTURE HAS BEEN DESIGNED AND FABRICATED TO DETERMINE THE CHARGE-GENERATING PROPERTIES OF THESE SAME FABRICS AND OTHER MATERIALS OF INTEREST. THE MODIFICATIONS TO INSTRUMENTATION AND THE NEW FIXTURE WILL NOW BE DOCUMENTED TO ENABLE DUPLICATION. TEST METHODS SUITABLE FOR INSERTION INTO FTMS#191 WILL BE GENERATED. STEP-BY-STEP OPERATING PROCEDURES FOR THE ENTIRE TEST SYSTEM WILL ALSO BE DOCUMENTED.

INDUSTRIAL QUALITY INC ARMY
PO BOX 2397 - 9832 CANAL RD
GAITHERSBURG, MD 20879
HAROLD BERGER
TITLE:
REAL-TIME STEREO-MICRORADIOGRAPHY
TOPIC: 80 OFFICE: MTL/LABCOM

REAL-TIME STEREO-MICRORADIOGRAPHY PERMITS THE DETECTION OF SMALL DEFECTS WITH THE ADDED CAPABILITY FOR CHARTERIZATION IN THREE DIRECTIONS. THE NEW FEATURE FITS WELL WITH NEEDS TO ASSESS THE CRITICAL NATURE OF DISCONTINUITIES IN MATERIALS SUCH AS CERAMICS AND WILL PROVIDE THE BASIS FOR ACCEPT/REPAIR/SCRAP DECISIONS. THIS PHASE II PROGRAM WILL LEAD TO THE DESIGN AND DEMONSTRATION OF PROTOTYPE, STEREO INSPECTION SYSTEM. THE PROGRAM WILL ADDRESS OPTIMUM METHODS TO MOVE A MICROFOCUS X-RAY SOURCE TO PREPARE THE DIFFERENT ORIENTATION STEREO VIEWS, METHODS FOR ELECTRONIC PROCESSING OF THE IMAGES TO ENHANCE RESULTS AND SEPARATE THE DIFFERENT VIEWS, AND PROCESSING OF THE IMAGES TO ENHANCE RESULTS AND SEPARATE THE DIFFERENT VIEWS, AND TECHNIQUES FOR STEREO VIEWING AND DATA PRESENTATION. THE DEVELOPED SYSTEM WILL HAVE THE CAPABILITY TO DETECT AND CHARACTERIZE DEFECTS AS SMALL AS 25 um IN SIZE.

INDUSTRIAL QUALITY INC AF
PO BOX 2397 - 9832 CANAL RD
GAITHERSBURG, MD 20879
HAROLD BERGER
TITLE:
COMBINED HOLOGRAPHIC-INFRARED INSPECTION
TOPIC: 41 OFFICE: AFWAL/ML

A COMBINED HOLOGRAPHIC-INFRARED INSPECTION METHOD IS PROPOSED. THE

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COMBINATION TECHNIQUE WILL PROVIDE MORE VALUABLE INTERPRETATION INFORMATION AND MORE QUANTITATIVE INSPECTION RESULTS THAN EITHER METHOD USED ALONE. THE FEASIBILITY OF A COMBINED INSPECTION TECHNIQUE WAS DEMONSTRATED IN THE PHASE I PROGRAM. IN PHASE II, THE TECHNICAL OBJECTIVES INCLUDE THE DETERMINATION OF HEATING METHODS FOR THE COMBINED INSPECTION, TAKING INTO ACCOUNT INTENSITY, TIME PERIOD OF APPLICATION AND SPECTRAL CHARACTERISTICS. THE DESIGN PLANS FOR THE PROTOTYPE INSPECTION SYSTEM WILL ALSO INCLUDE CAPABILITY FOR MECHANICAL EXCITATION FOR HOLOGRAPHIC INTERFEROMETRY AND PROVISION FOR THROUGH-TRANSMISSION INFRARED IMAGING. A PROTOTYPE COMBINED INSPECTION SYSTEM WILL BE DESIGNED AND TESTED, PRIMARILY WITH COMPOSITE SAMPLES. THE COMPLEMENTARY INSPECTION INFORMATION AVAILABLE FROM EACH METHOD PROVIDES DATA NEEDED TO DETERMINE THE DISCONTINUITY SIZE, DEPTH AND TYPE, QUANTITATIVE INFORMATION THAT IS VITAL TO PREDICTING COMPONENT PERFORMANCE. A BROADLY USEFUL, EASILY APPLIED INSPECTION TECHNIQUE WILL RESULT FROM THIS INVESTIGATION.

INTEGRATED CHEMICAL SENSORS ARMY
44 MECHANIC ST
NEWTON, MA 02164
DR GLENN BASTIAANS
TITLE:
BIOMICROSENSOR TECHNOLOGY: DEVELOPMENT OF SAW MASS DET DEVICES
TOPIC: 19 OFFICE: CRDC

THE PURPOSE OF THIS PROGRAM IS TO FURTHER THE DEVELOPMENT OF SURFACE ACOUSTIC WAVE MICROSENSORS FOR THE DETECTION OF CHEMICAL/BIOLOGICAL WARFARE AGENTS IN LIQUID. THE PHASE I EFFORT DEMONSTRATED THE EFFECTIVENESS OF THE ICSC MICROGRAVIMETRIC IMMUNOASSAY SYSTEM FOR DETECTING HIGH MOLECULAR WEIGHT AGENTS. THIS PROGRAM WILL EXTEND THOSE ACCOMPLISHMENTS BY FURTHER OPTIMIZING THE SURFACE CHEMISTRY AND ELECTRONICS; DETECTING LOW MOLECULAR WEIGHT AGENTS, AND TESTING HIGH FREQUENCY ARRAY SYSTEMS WITH INTACT ORGANISMS AND A KNOWN TOXIN. THE USE OF RECEPTORS AS BINDING AGENTS WILL ALSO BE INVESTIGATED ON A PRELIMINARY BASIS. IT IS ANTICIPATED THAT THE SENSING SYSTEMS BEING DEVELOPED IN THIS PROGRAM WILL PROVIDE SELECTIVE, SENSITIVE, RUGGED, LOW POWER AND COST EFFECTIVE COMPONENTS OF FIELD CBW DEFENSE SYSTEMS.

INTEGRATED SOFTWARE INC AF
PO BOX 295
PALM BAY, FL 32905
SAMUEL S HARBAUGH
TITLE:
ADA OPERATING SYSTEM PRIMITIVES IMPLEMENTED IN HARDWARE
TOPIC: 23 OFFICE: AFWAL AA

PHASE I DEFINED OPERATING SYSTEM PRIMITIVES WHOSE IMPLEMENTATION IN

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HARDWARE IS FEASIBLE AND GREATLY IMPROVES PERFORMANCE. THESE PRIMITIVES SUPPORT TASK MANAGEMENT, TIMER SERVICES AND MEMORY MANAGEMENT. FOR TASK MANAGEMENT PRIMITIVES, THE PAYOFF WAS FOUND TO BE IN THE APPLICATION OF ADA TO EMBEDDED REAL-TIME SYSTEMS, SUCH AS AVIONICS, WHERE TASKS ARE SWITCHED AT HIGH RATES. TIMER SERVICE PRIMITIVES ALLOW TIME DELAYS OF HIGH RESOLUTION/ACCURACY AND CYCLIC EXECUTIVES, BOTH VITAL TO AVIONICS SOFTWARE AND NOT PROVIDED BY THE ADA LANGUAGE. MEMORY MANAGEMENT PRIMITIVES ALLOW MEMORY GARBAGE COLLECTION (NOT REQUIRED OF ADA IMPLEMENTATIONS) SO THAT FULL-ADA CAN BE USED IN AVIONICS SOFTWARE. PHASE II PROPOSES TO PRODUCE AT LEAST ONE WORKING MODEL OF THE PRIMITIVES DEFINED IN PHASE. IT IS PROPOSED TO DESIGN A CUSTOM VLSI CHIP AND PC BOARD TO FUNCTION AS A MICROCOMPUTER COPROCESSOR AND MODIFY AN ADA RUN-TIME ENVIRONMENT TO UTILIZE THE CUSTOM HARDWARE. THE MODEL WILL VERIFY THE PERFORMANCE IMPROVEMENT PREDICTED IN PHASE I AND DEMONSTRATE THE FEASIBILITY OF USING ADA FOR AVIONICS SOFTWARE.

INTEGRATED SYSTEMS INC ARMY
101 UNIVERSITY AVE
PALO ALTO, CA 94301
ROBERT A WALKER
TITLE:
ARTIFICIAL INTELLIGENCE AND ADVANCED CONTROL FOR ROBOTI
TOPIC: 13 OFFICE: ARDC

NO ABSTRACT AT THIS TIME

INTEGRATED SYSTEMS INC AF
101 UNIVERSITY AVE
PALO ALTO, CA 94301
ROBERT A WALKER
TITLE:
SECOND GENERATION CAE SYSTEMF OR AEROSPACE VEHICLE DESI
AND ANALYSIS
TOPIC: 17 OFFICE: ASD/XR

AUTOMATIC CONTROL DESIGN AND ANALYSIS, MODELING, SIMULATION, AND OPTIMIZATION TASKS CAN BE GREATLY ENHANCED THROUGH INTERACTIVE, COMPUTER-AIDED ENGINEERING (CAE) TOOLS. SUCH TOOLS HAVE BEEN LARGELY UNAVAILABLE IN AEROSPACE, MECHANICAL, PROCESS CONTROL AND VEHICLE DESIGN INDUSTRIES, WHERE LARGE RESOURCES ARE EXPENDED TO DEVELOP SPECIALIZED SOFTWARE WITH COMPLEX, ARCHITECTURE AND USER SYNTAX.

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INTEGRATED SYSTEMS, INC. HAS DEVELOPED AN INTERACTIVE COMPUTER AIDED CONTROL SYSTEM DESIGN AND MODELING PACKAGE, CALLED MATRIX(x). MATRIX(x) IS USED BY OVER FIFTY COMPANIES, UNIVERSITIES AND LABORATORIES. PHASE I HAS MADE MATRIX(x) AVAILABLE TO ASD, EXTENDED CAPABILITIES FOR TRAJECTORY OPTIMIZATION AND RESEARCH AND DEVELOPED A DETAILED PLAN FOR THE PHASE II DEVELOPMENT OF A COMPREHENSIVE AEROSPACE VEHICLE LAYER FOR MATRIX(x), WITH DATA BASE INTERFACES AND MODEL LIBRARIES TO PERFORM AEROSPACE VEHICLE AND SUBSYSTEM DESIGN TRADEOFF STUDIES.

INTERNATIONAL SUPERTECH LABS INC NAVY
2442 33RD ST
SANTA MONICA, CA 90405
TRIEU-KIEN TRUONG
TITLE:
VHSIC DESIGN FOR COMPUTING THE DISCRETE FOURIER TRANSFO
USING RESIDUE FERMAT NUMBER SYSTEM
TOPIC: 125 OFFICE: NWSC

*THE DEVELOPMENT OF VHSIC DEVICES PRESENTS MANY NEW AND CHALLENGING AREAS OF RESEARCH. BY USING THE RESIDUE FERMAT NUMBER SYSTEM TO IMPLEMENT A VHSIC DISCRETE FOURIER TRANSFORM (DFT) IN CMOS CHIP, REQUIRED ONLY A SMALL NUMBER OF MULTIPLICATIONS. THE TRADITIONAL DFT DESIGN REQUIRED VERY LARGE NUMBER OF MULTIPLICATIONS, VERY COMPLICATED CIRCUIT, AND LARGE AREAS. THE PROPOSED NEW DESIGN DFT WOULD RESULT IN A VERY COMPACT VLSI SHIP, VERY HIGH PERFORMANCE, AND VERY LOW POWER CONSUMPTION. THE OBJECTIVE OF THIS PROPOSAL IS TO DESIGN, DEVELOP, AND IMPLEMENT A STATE-OF-THE-ART DFT CHIP FOR ANY APPLICATIONS RELATED TO DIGITAL SIGNAL PROCESSING. THE FIRST PHASE OF THIS PROPOSAL, ATTENTION IS FOCUSED ON THE THEORETICAL BACKGROUND OF USING RESIDUE FERMAT NUMBER SYSTEM TO IMPLEMENT A DFT, AND THEN FOCUSED ON THE POSSIBLE CONFIGURATION OF LOGIC STRUCTURES. THE PHYSICAL IMPLEMENTATION OF THE DFT WILL BE A 16-POINT DFT.

IRT CORP ARMY
1364 BEVERLY RD
MCLEAN, VA 22101
J KLEBERS
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC
(EMP)
TOPIC: 93 OFFICE: MED/R&D

THE OBJECTIVES OF THIS PROGRAM ARE: 1.) TO DEVELOP A COMPREHENSIVE

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PRODUCT IMPROVEMENT PLAN (PIP) FOR PROTECTION OF ARMY MEDICAL EQUIPMENT AGAINST THE NUCLEAR ELECTROMAGNETIC PULSE (EMP), 2.) DEVELOP A METHODOLOGY FOR EMP HARDNESS VERIFICATION TESTING OF MEDICAL SYSTEMS, AND 3.) TO DEMONSTRATE THE PIP METHODOLOGY DEVELOPED THROUGH IMPLEMENTATION OF EMP HARDENING ON ONE CRITICAL MEDICAL UNIT. THE ACCOMPLISHMENT OF THE ABOVE PROGRAM FOR THE ARMY'S MEDICAL EQUIPMENT. IT WILL ALSO BE A SIGNIFICANT STEP TOWARD DEMONSTRATION OF A PROGRAM APPROACH TO PROTECTING OTHER CRITICAL NON-DEVELOPMENTAL ITEMS (NDIs) IN THE PRESENT AND FUTURE INVENTORY AGAINST THE NUCLEAR ELECTROMAGNETIC PULSE.

JAYCOR AF
PO BOX 85154
SAN DIEGO, CA 92138
B C PASSENHEIM
TITLE:
HARDENING LASER GYROSCOPES
TOPIC: 85 OFFICE: AFBMOPMX

THIS PROPOSAL ADDRESSES TWO RELATED LASER GYRO TECHNICAL ISSUES: (1) RADIATION HARD LOW LIGHT LEVEL PHOTODETECTORS AND (2) DETERMINING WHY THE "LOCK-IN" RANGE OF A GYRO INCREASES IF IT IS OPERATED AT "LOCK-IN". A DIGICON IS A PHOTOMULTIPLIER TUBE WITH A PHOTODIODE DETECTOR. BECAUSE THE OPTICAL PHOTOCURRENT IS MULTIPLIED BUT THE RADIATION PHOTOCURRENT IS NOT, THE SIGNAL-TO-NOISE RATIO (S/N) IN DELAYED RADIATION IS ENHANCED. IN PHASE I WE USED AVAILABLE HARDWARE TO DEMONSTRATE THIS PRINCIPLE. NOW WE PROPOSE TO IMPROVE THE DEVICE BY REDUCING ITS SIZE AND OPTIMIZING THE PHOTODIODE. OPERATING A LASER GYRO AT TOO LOW AN ANGULAR VELOCITY CAUSES THE TWO OPTICAL FRE--QUENCIES TO LOCK TOGETHER. EXTENDED OPERATION CAUSES THE "LOCK-IN" RANGE TO GROW. WE POSTULATE THAT THE COMBINATION OF UNIFORM UV ILLUMINATION FROM THE HeNe DISCHARGE AND STATIC 0.633 MICROMETERS LASER INTERFERENCE PATTERN DEVELOPS A PATTERN OF COLOR CENTERS IN THE DIELECTRIC MIRRORS WHICH ACTS AS A DIFFRACTION GRATING. SEVERAL PIECES OF EVIDENCE TO SUPPORT THIS MODEL ARE PRESENTED. A TEST TO VALIDATE THE MODEL IS DESCRIBED. FURTHERMORE, WE BELIEVE THIS PHYSICAL MODEL IS CONSISTENT WITH CHANGES IN LASER GYRO PERFORMANCE NOTED IN A NUCLEAR UNDERGROUND TEST. "LOCK-IN" TOLERANT MIRRORS WILL ALSO BE RADIATION TOLERANT.

JAYCOR AF
PO BOX 85154 - 11011 TORREYANA RD
SAN DIEGO, CA 92138
ROBERT A POLL
TITLE:
DIRECTED ENERGY WEAPONS EFFECTS PHENOMENOLOGY
TOPIC: 109 OFFICE: AFBMO/PMX

THE OBJECTIVES OF THIS PHASE II PROGRAM ARE TO PERFORM ANALYSES AND

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EXPERIMENTS TO REDUCE UNCERTAINIES IN DIRECTED ENERGY WEAPON (DEW) PHENOMENOLOGY THAT PREVENT ACCURATE PREDICITIONS OF STRATEGIC BALLISTIC MISSILE SYSTEM SURVIVBILITY TO DEW EFFECTS AND PREVENT DEVELOPMENT OF COST-EFFECTIVE HARDENING MEASURES. THE PROPOSED PROGRAM CONSISTS OF EXPERIMENTS SUPPLEMENTED BY ANALYSIS TO OBTAIN EFFECTS DATA ON THE INTERACTION OF NEUTRAL PARTICLE AND HIGH POWER MICROWAVE BEAMS ON HARDWARE CHARACTERISTIC OF MODERN MISSILE TECHNOLOGY. THE RESULTS FROM THE EXPERIMENTS WILL QUANTIFY POTENTIAL LOW-LEVEL MISSILE SYSTEM SUSCEPTIBILITIES THAT COULD MAKE MISSILE SYSTEMS POTENTIALLY VULNERABLE TO LOW-LEVEL DEW THREATS. THE BENEFITS OF THE PROPOSED RESEARCH ARE THE INCREASED ACCURACY OF SUSCEPTIBILITY ASSESSMENTS. THE QUANTIFICATION OF POTENTIAL LOW-LEVEL SUSCEPTI-BILITIES, AND THE IDENTIFICATION OF COST-EFFECTIVE HARDENING MEASURES TO REDUCE MISSILE SUSCEPTIBILITIES TO DEW THREATS.

JAYCOR AF
PO BOX 85154 - 11011 TERREYANA RD
SAN DIEGO, CA 92138
DR S ERIC WHEATLEY
TITLE:
OPTICAL HIGH PRESSURE SENSOR
TOPIC: 117 OFFICE: AFBMO/PMX

PRESSURE SENSORS WHICH ARE CURRENTLY AVAILABLE FOR MECHANICAL RESPONSE MEASUREMENTS OF PROTECTIVE SHELTERS EXPOSED TO SEVERE BLAST AND SHOCK ENVIRONMENTS OFTEN FAIL TO SURVIVE, HAVE LIMITED BANDWIDTH, AND ARE SUSCEPTIBLE TO EMI. DIRECT OPTICAL PRESSURE MEASUREMENT COMBINED WITH FIBER-OPTIC SIGNAL TRANSMISSION ARE THE BASIS FOR AN IMPROVED PRESSURE SENSOR WITH ENHANCED SURVIVABILITY, INCREASED BAND-WIDTH, AND EMI IMMUNITY. RUBY HAS LONG BEEN USED FOR THE MEASURE-MENT OF STATIC HIGH PRESSURES. IN PHASE I, THE FEASIBILITY OF DYNAMIC PRESSURE MEASUREMENTS USING RUBY WAS DEMONSTRATED. HOWEVER, OTHER MATERIALS CAN PROVIDE IMPROVED SENSOR PERFORMANCE. IN THIS WORK, WE WILL 1) CHOOSE NEW SENSOR MATERIAL FOR USE IN THE SENSOR, 2) CALIBRATE THE NEW MATERIAL IN THE VERY HIGH PRESSURE FACILITY DEVELOPED IN PHASE I, 3) CONSTRUCT A SENSOR HOUSING APPROPRIATE FOR SENSOR PERFORMANCE AND SURVIVABILITY, 4) [illegible] THE SIGNAL RECORD-ING APPARATUS, AND 5) COMPARE THE PERFORMANCE OF THE OPTICAL PRESSURE GAUGE AND CONVENTIONAL PIEZORESISTIVE GAUGES IN A FIELD TEST.

JAYCOR [illegible]
PO BOX 85154
SAN DIEGO, CA 92138
DR FRANKLIN S FELBER
TITLE:
USE OF LASERS IN NUCLEAR EFFECTS SIMULATION
TOPIC: 2 OFFICE: DDST

*JAYCOR HAS PERFORMED PRELIMINARY IR&D EXPERIMENTS AND NUMERICAL

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SIMULATION OF THE INTERACTION OF LASERS WITH SOLID TARGETS. THE RESULTS SUGGEST THAT A CERTAIN CLASS OF LASERS MAY BE USEFUL. IN SIMULATING AT LEAST TWO IMPORTANT NUCLEAR WEAPON EFFECTS: (1) THE SCALED ELECTROMAGNETIC RESPONSE OF A CONDUCTING BODY, AND (2) THE SOFT ELECTRON EMISSION SPECTRUM. THIS PROGRAM IS A JOINT EXPERIMENTAL AND THEORETICAL EFFORT TO DETERMINE THE FEASIBILITY OF USING LASERS FOR NUCLEAR WEAPON SIMULATIONS, TO GENERATE APPROPRIATE DATA ON LASER EFFECTS, AND TO COMPARE THE LASER EFFECTS DATA WITH CORRESPONDING NUCLEAR EFFECTS DATA.

JAYCOR DNA
PO BOX 85154
SAN DIEGO, CA 92138
DR T L SPERLING
TITLE:
SCINTILLATION MODEL DEVELOPMENT AND EXPERIMENTAL VERIFI
TOPIC: 2 OFFICE: DDST

*BECAUSE INTERNATION TREATIES PRECLUDE HIGH-ALTITUDE NUCLEAR TESTS, THERE IS LITTLE RELEVANT DATA FROM NUCLEAR BURSTS REGARDING THE SIZE AND DYNAMICS OF STRIATIONS IN NUCLEAR PLUMES OR EVEN THE BASIC PHYSICAL CONDITIONS WHICH PERMIT THE EVOLUTION OF STRIATIONS. THE UNDERSTANDING OF STRIATION BEHAVIOR IS IMPORTANT, AS STRIATIONS GENERATED WHEN THE IONOSPHERE IS DISTURBED BY NATURAL OR NONNUCLEAR MANMADE PROCESSES HAVE BEEN CLEARLY DEMONSTRATED TO HAVE ADVERSE EFFECTS ON COMMUNICATIONS LINKS. WE PROPOSE TO USE A LARGE PLASMA CHAMBER PRESENTLY AT JAYCOR TO CONDUCT AN EXPERIMENTAL STUDY OF THE SIZE AND DYNAMICS OF STRIATIONS IN A CONTROLLED AND HIGHLY DIAGNOSED LABORATORY ENVIRONMENT. IN PHASE I WE WOULD DEMONSTRATE THE FEASIBILITY AND METHODOLOGY OF SUCH A STUDY. IF SUCCESSFUL, SUCH A LABORATORY SIMULATION OF PLUME STRIATIONS COULD ISOLATE THE RELEVANT PHYSICS CONTROLLING THE PROBLEM OF MICROSTRUCTURES IN NUCLEAR PLUMES. BY ITERATION AND CLOSE COORDINATION WITH THE THEORETICAL EFFORT PRESENTLY FUNDED BY THE DEFENSE NUCLEAR AGENCY, THE LBORATORY SIMULATION SHOULD ALLOW THE DEVELOPMENT OF PRECISE MICROSTRUCTURE ALGORITHMS FOR USE IN NUCLEAR-EFFECTS SIMULATIONS LIKE SCENARIO.

JAYCOR AF
PO BOX 85154
SAN DIEGO, CA 92138
DR DAVID A SARGIS
TITLE:
SEARCH ALGORITHM FOR INTELLIGENT RE-ENTRY VEHICLES
TOPIC: 91

THIS PROPOSAL IS [illegible] DEVELOPING INNOVATIVE ARTIFICIAL

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INTELLIGENCE (AI) TECHNIQUES TO THE PROBLEM OF LOCATING, STRIKING, AND ASSESSING DAMAGE TO RELOCATABLE TARGETS. AT PRESENT, NO SMART ALGORITHMS AND INHERENT AI PROCEDURES EXIST WHICH CAN BE CARRIED ON A REENTRY BUS, AND CAN RELIABLY IDENTIFY MOBILE TARGETS IN THE SHORT RESPONSE TIMES REQUIRED IN FLIGHT. THIS PROGRAM IS AIMED AT DEVLOPING AN AI-BASED EXPERT SYSTEM WHICH CAN BE CARRIED ON A SMART BUS AND CAN ASSIST IN COUNTERING RELOCATABLE TARGETS.

JAYCOR AF
PO BOX 85154
SAN DIEGO, CA 92138
DR JOHN L WILSON
TITLE:
GAMING SIMULATOR TO ATTACK RELOCATABLE TARGETS
TOPIC: 102 OFFICE: AFBMO/PMX

LOCATING TARGETS WHICH MOVE RAPIDLY AND FREQUENTLY REQUIRES AN INTERPLAY OF TARGET DATA BASES, SENSOR TECHNOLOGIES, INFORMATION PROCESSING AND TRANSMISSION, AND COMMAND/CONTROL TECHNIQUES. WE HEREIN PROPOSE TO CONSTRUCT A SIMULATOR DESIGNED TO TEST THIS INTERPLAY BY CARRYING OUT A REPEATED GAMING PROCEDURE INVOLVING TARGET SIGNALS, INTERFERENCE SIGNALS, SENSOR PERFORMANCE, DATA INTERPRETATION TECHNIQUES, AND TARGETING ALGORITHMS. THE SIMULATOR WILL ORIGINALLY BE COMPUTER ORIENTED. ONE ELEMENT WILL USE KNOWN WEAPON, WEATHER, AND COUNTERMEASURE SIGNATURES TO SPECIFY EMITTED SIGNALS AT RADOM LOCATIONS. THE SIMULATOR WILL STORE SENSOR CHARACTERISTICS (SENSITIVITY, RESOLUTION, SPECTRAL RANGE, LOCATION, ETC.) AND DETERMINE THE SENSOR RESPONSE TO THE SIGNAL ARRAY. A C3 ELEMENT WILL INTERPRET THE SIGNALS, REDIRECT, AND REDEPLOY SENSORS, AND DRIVE TARGETING ALGORITHM DEVELOPED UNDER OTHER PROGRAMS. THE PROPOSED PROJECT WOULD FORM A GLOBAL RT GAMING CAPABILITY TO BEGIN TO GUIDE SYSTEM DEVELOPMENT OPTIMIZATION, RESOURCE ALLOCATION, DATA FLOW RATE PREDICTIONS, AND C3 NEEDS. SIMULATION IS A WELL ESTABLISHED TECHNIQUE FOR EVALUATING COMPLEX SYSTEMS.

JAYCOR SDIO
PO BOX 85154 - 11011 TORREYANA RD
SAN DIEGO, CA 92138
KENNETH G MOSES
TITLE:
OPTOMIZED VOLUMETRIC NEGATIVE HYDROGEN ION SOURCE
TOPIC: 17 OFFICE: IST

NO ABSTRACT FOR JAYCOR

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KFO ASSOCS INC ARMY
6 PEARL CT
ALLENDALE, NJ 07401
JERRY T LEWIS
TITLE:
HELICAL SCAN FOR ROBOTIC VISION
TOPIC: 81 OFFICE: LABCOM/HEL

THIS PROJECT WILL DESIGN, CONSTRUCT AND TEST THE PROTOTYPE DEVELOPMENT OF HELICAL SCAN IN THE IMAGER AND IN THE DISPLAY. THE COMPOSITE VISION SYSTEM WILL COMPRISE THE PARAMETERS THAT WERE DERIVED FROM PHASE I; NAMELY A DOUBLE SPIRAL INTERLACED 2:1 WITH A CLOCKWISE AND COUNTER-CLOCKWISE FIELD, EACH OF 250 RINGS. THE FORMAT WILL PRESENT AN IMAGE UPDATE OF 30 FRAMES A SECOND AND A DISPLAY REFRESH OF 60 FIELDS A SECOND. WITH A LEAD TIME IN THE OUTSIDE VENDOR DEVELOPMENT OF SOLID STATE DEVICES FOR IMAGING (CCD) AND DISPLAY (LCD), A LABORATORY MODEL WILL BE BUILT FOR TEST AND EVALUATION OF STEREOPSIS. THE APPLICATION WILL FOLLOW THE REQUIREMENTS OF A TELEOPERATED VEHICLE FOR EXPLOSIVE ORDNANCE DISPOSAL. EXPERIMENTS IN FRAME SEQUENTIAL COLOR WILL BE CONDUCTED ON THE MONOCHROMATIC SYSTEM.

KLEIN ASSOCS AF
PO BOX 264 - 740 WRIGHT ST
YELLOW SPRINGS, OH 45387
GARY A KLEIN
TITLE:
ELICITING AND STRUCTURING EXPERT JUDGEMENT IN S/V ANALY
TOPIC: 148 OFFICE: AFWL/PRC

IT IS ESSENTIAL THAT THE AIR FORCE BE ABLE TO PREDICT THE SURVIVABILITY AND VULNERABILITY (S/V) OF STRUCTURES AND THEIR CONTENTS EXPOSED TO VARIOUS TYPES OF BLAST AND SHOCK WAVES. DIRECT TESTING IS TIME-CONSUMING, EXPENSIVE, AND OFTEN NOT FEASIBLE. ATTEMPTS TO DEVELOP FORMAL MODELS HAVE BEEN LIMITED BECAUSE OF THE COMPLEXITY OF THE PROBLEM. THE PRIMARY OBJECTIVE OF PHASE II IS TO EXTEND THE PHASE I COMPARISON-BASED PREDICTION (CBP) APPLICATION IN THREE AREAS: THE DEVELOPMENT OF EXPERT SYSTEMS FOR S/V PREDICTION; THE REFINEMENT AND VALIDATION OF THE CBP METHODOLOGY FOR THE S/V DOMAIN (INCLUDING THE DEVELOPMENT OF SOFTWARE FOR IMPLEMENTING CBP); AND THE DEVELOPMENT OF TRAINING MATERIALS FOR PERSONNEL INVOLVED IN PREDICTING S/V PARAMETERS. PHASE I ESTABLISHED THE FEASIBILITY OF CBP FOR STRUCTURING EXPERT JUDGMENT, SPECIFICALLY FOR IMPROVING

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SUBJECTIVE PREDICTIONS BY ANCHORING THEM IN EXISTING DATA AND BY CREATING AN AUDIT TRAIL DOCUMENTING HOW THE PREDICTIONS WERE MADE. PHASE I DEMONSTRATED THAT THE CBP METHOD CAN IMPORVE THE RELIABILITY OF PREDICTIONS AND THAT IT COULD ELICIT THE TACIT EXPERT KNOWLEDGE FOR MAKING JUDGMENTS AND POTENTIALLY FOR DEVELOPING EXPERT SYSTEMS. PHASE II WILL CAPITALIZE ON THESE ACCOMPLISHMENTS.

KMS FUSION INC ARMY
PO BOX 1567 - 3621 S STATE RD
ANN ARBOR, MI 48106
WILLIAM J POLLARD
TITLE:
AI ENHANCED PATH PLANNING FOR ROBOTIC VEHICLES - PHASE
TOPIC: 67 OFFICE: TACOM

THIS PROPOSED PHASE II EFFORT FOR AI ENHANCED PATH PLANNING FOR ROBOTIC VEHICLES WILL DEVELOP PROTOTYPE DATA BASES, RULES, AND SOFTWARE FOR A GLOBAL PATH PLANNER FOR DEPLOYMENT IN THE AUTONOMOUS GROUND VEHICLE TECHNOLOGY (AGVT) TEST BED PROGRAM. THE GLOBAL PATH PLANNER WILL EMPLOY MILITARY EXPERT DERIVED RULES OPERATING UPON TERRAIN, AND OTHER DATA BASES TO YIELD A PATH PLAN SUITABLE FOR USE BY THE 'VEHICLE COMMANDER' FUNCTION. THE GLOBAL PATH PLANNER WILL BE ABLE TO SUPPORT THE EXECUTION OF A MILITARY MISSION IN EITHER AN AUTONOMOUS OR SEMI-AUTONOMOUS (I.E. TELE-OPERATED) VEHICLE. THE PROTOTYPE GLOBAL PATH PLANNER WILL OPERATE WITHIN A MICROCOMPUTER ENVIRONMENT CONSISTENT WITH THE AGVT TEST BED PROGRAM. DIGITAL TERRAIN DATA BASES FOR FOUR TEST SITES WILL BE DEVELOPED. FIELD VERIFICATION OF THE EFFECTIVENESS OF THE RULES AND COMPUTER PLANNED PATHS IS PLANNED.

KTECH CORP AF
901 PENNSYLVANIA NE
ALBUQUERQUE, NM 87110
DAVID J FOGELSON
TITLE:
HARDENED REMOTE DATA ACQUISITION SYSTEM
TOPIC: 147 OFFICE: AFWL/PRC

THE PROPOSED DEVELOPMENT OF A HARDENED, REMOTE, DATA ACQUISITION SYSTEM IS PRESENTED IN THIS DOCUMENT. THE FEASIBILITY STUDY CONDUCTED DURING PHASE I OF THIS EFFORT DEMONSTRATED A SINGLE CHANNEL

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VERSION OF THE DATA ACQUISITION SYSTEM WITH A BENCH TOP SIMULATOR, AND SHOWED THE METHODOLOGY REQUIRED FOR HARDENING THE SYSTEM. THE SYSTEM WOULD BE CAPABLE OF ACQUIRING DATA FROM ALL TYPES OF PIEZO-RESISTIVE TRANSDUCERS WITH ONE, TWO, OR FOUR ACTIVE ARM BRIDGES WITH A FREQUENCY RESPONSE AT LEAST A FACTOR OF TEN BETTER THAN IS PRESENTLY AVAILABLE. DESIGN GOALS FOR THE EIGHT CHANNEL, HARDENED REMOTE UNIT INCLUDE THE CAPABILITY OF WITHSTANDING 20,000G AND 1 KBAR, PROVIDE A DATA RECORD RATE OF 2 MICROSECONDS PER POINT WITH A DATA WINDOW OF 0.1 SECOND. THE SYSTEM WOULD BE BATTERY POWERED AND CONTROLLED BY AN ON-BOARD MICROPROCESSOR PROGRAMMED FROM A MASTER COMPUTER IN A CONTROL TRAILER. THE SYSTEM WOULD REDUCE INSTRUMENTATION CABLE LONG LINES TO ONE-EIGHTH OF PRESENT REQUIREMENTS AND WOULD REDUCE THE NUMBER OF INSTRUMENTATION/RECORDING TRAILERS REQUIRED AT A HIGH EXPLOSIVE FIELD TEST FROM THREE TO ONE. DATA REDUCTION TIME WOULD BE GREATLY REDUCED BECAUSE THE SYSTEM IS DIGITAL AND QUICK LOOK DATA REDUCTION WOULD BE ACCOMPLISHED IN THE FIELD IMMEDIATELY AFTER THE TEST EVENT.

L N K CORP INC NAVY
302 NOTLEY COURT
SILVER SPRING, MD 20740
DAVID LAVINE
TITLE:
AUTOMATIC FEATURE EXTRACTION FOR DIGITAL SIMULATOR DATA
TOPIC: 133 OFFICE: NAVAIR/NTSC

*THE AMOUNT OF HUMAN EFFORT CURRENTLY REQUIRED TO ASSEMBLE DATABASES FOR SIMULATORS IS FORMIDABLE. ADVANCES IN AUTOMATIC SCENE ANALYSIS GIVE RISE TO THE POSSIBILITY OF DEVELOPING A SYSTEM THAT COULD AUTOMATICALLY GENERATE AN IMAGE DATABASE FROM HIGH ALTITUDE IMAGERY. IN PHASE I L.N.K. CORPORATION PLANS TO DESIGN A SYSTEM THAT WILL INCORPORATE ELEMENTS OF ARTIFICIAL INTELLIGENCE, CARTOGRAPHY AND IMAGE PROCESSING. WE PLAN TO DEMONSTRATE THE FEASIBILITY OF THE STUDY WITH A PARTIAL IMPLEMENTATION ON DATA, IF AVAILABLE.

LB&M ASSOCS AF
4411 W GORE BLVD - BLDG B STE 9
LAWTON, OK 73505
EDWARD FOSKEY
TITLE:
PROTECTING THE SMALL ICBM
TOPIC: 120 OFFICE: AFBMO/PMX

BECAUSE OF ITS POLITICALLY SENSITIVE NATURE AS A NUCLEAR WEAPON AND

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ITS DEPLOYMENT WITHIN THE CONTINENTAL UNITED STATES, THE HARD MOBILE LAUNCHER BASING CONCEPT FOR THE SMALL ICBM IS LIKELY TO BE TARGETED FOR ATTACK BY A VARIETY OF CONVENTIONAL THREATS TO INCLUDE TERRORISTS, SABOTEURS, DISSIDENTS AND ANTI-NUCLEAR ACTIVISTS. BASED ON THE THREATS AND SECURITY CONCEPTS IDENTIFIED IN PHASE I OF THIS STUDY, PHASE II WILL PROVIDE A RIGOROUS STUDY OF THE OPERATIONAL AND TECHNOLOGICAL SOLUTIONS TO THE PHYSICAL SECURITY PROBLEM USING A TOTAL SYSTEM APPROACH. THE PHASE II ANALYSIS WILL INCLUDE DEVELOPMENT OF A BASE CASE ORGANIZATIONAL AND OPERATIONAL CONCEPT FOR THE HML, IDENTIFICATION OF SECURITY ENHANCED ALTERNATIVES AND THE EVALUATION OF THOSE ALTERNATIVES IN QUANTITATIVE TERMS THROUGH A COST AND OPERATIONAL EFFECTIVENESS ANALYSIS. LIKELY SECURITY SHORTFALLS IN THE SYSTEM WILL THEN BE IDENTIFIED THROUGH A RISK EVALUATION OR FAIL-SAFE ANALYSIS OF THE RESULTS OF THE QUANTITATIVE ANALYSIS. CONCURRENT WITH THE ANALYTICAL EFFORT, MAJOR DEFENSE INDUSTRIES WILL BEGIN TO ASSEMBLE PROTOTYPE SYSTEMS WHICH EXPLOIT THE IDENTIFICATION SECURITY TECHNOLOGIES. THE FINAL STAGES OF THE STUDY WILL CONSIST OF THE TEST AND EVALUATION OF THESE PROTOTYPES AND A RECOMMENDATION FOR INCORPORATION OF SPECIFIC SYSTEMS WHICH FULFILL THE SICBM SECURITY REQUIREMENTS.

LICA SYSTEMS INC AF
10400 EATON PL - STE 100
FAIRFAX, VA 22030
DR JOHN G ALLEN
TITLE:
INTEGRATED PROCESS FOR LOB CORRELATION AND CLASSIFICATI
OF BATTLEFIELD TARGETS
TOPIC: 176 OFFICE: ESD/XRCT

*THIS PROPOSAL SUGGESTS AN UNCONVENTIONAL TECHNIQUE FOR CORRELATING LINES OF BEARING OBTAINED FROM INDEPENDENT MEASUREMENTS OF EMITTER CHARACTERISTICS. THE TECHNIQUE WILL EMPLOY SPECIFIC EMITTER IDENTIFICATION IN THE BROADEST SENSE USING ALL INFORMATION WHICH IS AVAILABLE TO CORRELATE LINES OF BEARING: SIGNAL NUANCES, GEOMETRY, FETURE-EMITTER ASSOCIATIONS, EMITTER-EMITTER ASSOCIATIONS, EMITTER-TARGET ASSOCIATIONS, AND COMMUNICATIONS-ELECTRONICS OPERATION INSTRUCTIONS. BY UTILIZING A VARIETY OF FEATURES AND EMITTER CHARACTERISTICS THE RESULTING PROCESS WILL BE ROBUST. CONVENTIONAL TECHNIQUES RELY ONLY ON ONE OR A FEW FINGERPRINT FEATURES (ALBEIT, PRECISE) AND ARE UNABLE TO ADAPT TO THE LOSS OR MODIFICATION OF THE FEATURE OR FINGERPRINT. THE METHOD PROPOSED HERE WILL NOT SUFFER

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THIS WEAKNESS.

LICA SYSTEMS INC AF
10400 EATON PL - STE 100
FAIRFAX, VA 22030
ROBERT K COFOD
TITLE:
ADVANCED TECHNIQUES FOR D AND D PENETRATION
TOPIC: 179 OFFICE: RADC

ANALYSIS IN PHASE I ESTABLISHED THE VARIETY AND COMPLEXITY OF THE D & D PROBLEM AND THE POTENTIAL FOR KNOWLEDGE SYSTEM APPLICATIONS. THE CONCEPT FOR THE SYSTEM IS THAT THE REASONED OPTIONS FOR D & D CAN BE PRODUCED FROM A RULE-BASED STRUCTURE WHICH CONTAINS KNOWLEDGE ABOUT D & D TECHNIQUES, SENSOR CAPABILITIES, AND TARGET FEATURES. THE SYSTEM ENVISIONED, "IVAN", WOULD HAVE THE PERSPECTIVE OF A MASKIROVKA PLANNER ON A SOVIET DIVISION STAFF. THIS SUFFESTS AN INNOVATIVE APPLICATION FOR EXPERT SYSTEMS--A "REVERSE PERSPECTIVE" IN A SPECIFIC TECHNICAL DOMAIN. THE PROTOTYPE IVAN WOULD BE MICRO COMPUTER BASED AND FOCUSED ON D & D TECHNIQUES AND TARGET FEATURES WHICH IMPACT THE IMAGERY SENSING-EXPLOITATION PROCESS. PHASE II WILL IMPLEMENT A BASELINE SYSTEM KNOWLEDGE STRUCTURE (KS), A TIME/SPACE (T/S) MODULE TO INTERACT WITH THE KS FOR SITUATIONAL INSTANTIATIONS, AND A GRAPHIC GENERATOR TO DISPLAY T/S SITUATIONAL REPRESENTATIONS. PHASE I KNOWLEDGE AND PROCEDURES WILL BE ENTERED INTO IVAN AND TEST CASES DEVELOPED. DEMONSTRATION AND KNOWLEDGE ACQUISITION FROM FIELD USERS WILL BE CONDUCTED WITH A FINAL VALIDATION TEST/DEMO AT RADC.

LICA SYSTEMS INC ARMY
10400 EATON PLACE - STE 100
FAIRFAX, VA 22030
KENNETH M IRISH JR
TITLE:
PROTOTYPE DISTRIBUTED COMBAT INTELLIGENCE DEVELOPMENT A PRODUCT DISTRIBUTION SYSTEM
TOPIC: 26 OFFICE: CECOM/COMADP

A CONCEPT WAS DEVELOPED FOR THE FUNCTIONAL AND PHYSICAL DISTRIBUTION OF COMBAT INTELLIGENCE DEVELOPMENT AND DISTRIBUTION WHICH IS CONSISTENT WITH ARMY ECHELON ROLES AND MISSIONS. PHASE II WILL IMPLEMENT AND DEMONSTRATE THE CONCEPT VIA A PROTOTYPE SYSTEM COMPRISED OF: APPLICATIONS SOFTWARE MODULES PERFORMING NODAL FUNCTIONS AND A

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SIMULATED PACKET RADIO NETWORK SERVING AS INTERNODAL COMMUNICATIONS. THE PROTOTYPE WILL BE SIMULATED BY THE ARMY'S ADVANCED PROCESSING TECHNIQUES DRIVER TO DEMONSTRATE OPERATION OF THE SYSTEM UNDER VARIOUS SENSOR INPUT LOADINGS.

LIGHT SPEED TECHNOLOGIES CORP AF
12021 S MEMORIAL PKWY
HUNTSVILLE, AL 35803
LARRY FULLERTON
TITLE:
ADVANCED RADAR CONCEPT FOR COVER CONCEALMENT AND DECEPT (CC&D) PENETRATION
TOPIC: 179 OFFICE: ESD/XRCT

*LIGHT SPEED TECHNOLOGIES CORPORATION, HUNTSVILLE ALABAMA, HAS DEVELOPED THE FUNDAMENTAL TECHNOLOGY FOR AN ADVANCED RADAR CONCEPT WHICH OFFERS QUANTUM INCREASES IN RADAR PERFORMANCE OVER THE TRADITIONAL RADAR APPROACHES. THE BASIC CONCEPT HAS BROAD APPLICATION AND PROVIDES POTENTIAL SOLUTIONS TO MANY PRESENT AND FUTURE RADAR REQUIREMENTS. THIS TECHNOLOGY OFFERS SUBSTANTIAL IMPROVEMENTS IN THE AREAS OF ENHANCED RADAR RESOLUTION (RANGE, DOPPLER, AND ANGLE), REDUCED SIGNATURE, CLUTTER PENETRATION, AND ALL WEATHER PERFORMANCE. THE BASIC TRANSMITTER CONCEPT HAS BEEN DEVELOPED AND DEMONSTRATED BY LIGHT SPEED TECHNOLOGIES. THE PROPOSED PHASE ONE EFFORT WILL ADDRESS COVER, CONCEALMENT, AND DECEPTION (CC&D) PENETRATION CONCEPTS USING TIME DOMAIN SPREAD SPECTRUM SYNTHETIC APERATURE RADAR (TDSSSAR) FOR THE IDENTIFICATION OF THE SIGNATURE OF A C3 HEADQUARTERS.

LIGHTWAVE ELECTRONICS CORP AF
897-4A INDEPENDENCE AVE
MOUNTAIN VIEW, CA 94043
ROBERT L MORTENSEN
TITLE:
MMIC VOLTAGE MEASUREMENT INSTRUMENT PROTOTYPE DEVELOPME
TOPIC: 196 OFFICE: RADC/XPX

A NONINVASIVE TECHNIQUE FOR PROBING HIGH SPEED GaAs CIRCUITS AND DEVICES IS PROVIDED BY ELECTRO-OPTIC SAMPLING OF VOLTAGE WAVEFORMS DIRECTLY IN THE HOST SEMICONDUCTOR. THIS TECHNIQUE USES PICOSECOND LASER PULSES AND THE ELECTRO-OPTIC EFFECT TO SAMPLE THE ELECTRIC FIELD PRODUCED BY THE MICROWAVE VOLTAGES. LIGHTWAVE ELECTRONICS PROPOSES TO USE THIS TECHNOLOGY TO DEVELOP A COMMERCIAL INSTRUMENT

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FOR CHARACTERIZING, TESTING, AND DEBUGGING MONOLITHIC MICROWAVE INTEGRATED CIRCUITS (MMICs). IN A SBIR PHASE I EFFORT, RECENTLY COMPLETED, LIGHTWAVE ELECTRONICS DEMONSTRATED PRACTICAL FEASIBILITY OF THIS TECHNIQUE. IN THIS PHASE II EFFORT LIGHTWAVE ELECTRONICS WILL BUILD A PROTOTYPE VOLTAGE MEASUREMENT INSTRUMENT. THE INSTRUMENT WILL BE USED TO PROBE OPERATING MMICs.

LNR COMMUNICATIONS INC AF
180 MARCUS BLVD
HAUPPAUGE, NY 11788
JOHANNES A DEGRUYL
TITLE:
GaAs IMPATT POWER MODULES FOR ACTIVE APERTURE APPLICATI
TOPIC: 25 OFFICE: AFWAL/AA

THE RAPID DEVELOPMENT OF SOLID STATE TECHNOLOGY MAKES IT POSSIBLE TODAY TO DEVELOP HIGH POWER SOLID STATE SATELLITE TRANSMITTERS AT EHF FREQUENCIES. THE SOLID STATE COMPONENTS PROMISE TO OFFER SUPERIOR TRANSMITTER RELIABILITY, ALTHOUGH WITH LESS POWER AND LOWER CONVERSION EFFICIENCY THAN TWTA'S. HOWEVER, IT IS CLEAR THAT SOLID STATE POWER SOURCES WILL DISPLACE THE TWTA'S IN THE FUTURE FOR SELECTED APPLICATIONS, PARTICULARLY IN CONJUNCTION WITH ACTIVE APERTURE ANTENNA SYSTEMS. CURRENT EHF IMPATT DEVICE TECHNOLOGY MAKES IS POSSIBLE TO ACHIEVE SUBSTANTIALLY HIGHER OUTPUT POWER COMPARED WITH PROJECTED FUTURE HEMT OR FET BASED POWER AMPLIFIERS AT 44 GHz. THEREFORE, AN IMPATT ARRAY ELEMENT POWER SOURCE REPRESENTS A REAL ADVANTAGE FOR HIGH EIRP AND HIGH RELIABILITY ACTIVE APERTURE APPLICATIONS. THE PROPOSED PHASE II PROGRAM IS TO DEVELOP THE APPROPRIATE 44 GHz IMPATT POWER MODULES FOR SPATIALLY COMBINED ACTIVE APERTURE 44 GHz SATCOM UPLINK TRANSMITTER USAGE UNDER ACTIVE APERTURE SYSTEM DESIGN CONSTRAINTS. FURTHERMORE, THE QUANTITATIVE CAPABILITY, OF GALLIUM ARSENIDE IMPATT DIODE AMPLIFIERS IN PHASED ARRAY ACTIVE APERTURE ANTENNA SYSTEMS FOR 44 GHz UPLINK WILL BE DEMONSTRATED.

LSI INC ARMY
PO BOX 3116
HUNTSVILLE, AL 35810
VIRGIL V VAUGHN
TITLE:
DYNAMIC BORESIGHT MENSURATION
TOPIC: 63 OFFICE: MICOM

A TECHNIQUE IS PROPOSED WHEREBY THE BORESIGHT ALIGNMENT BETWEEN A

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HELICOPTER MISSILE OR ROCKET SUPPORT STRUCTURE AND A CONVENIENT REFERENCE SYSTEM CAN BE MEASURED IN REAL TIME TO PREDICT THE OCCURRENCE OF THE BEST ALIGNMENT. THE TECHNIQUE EMPLOYS FAST SCANNING PROGRAMABLE OPTICAL SENSORS AND FAST SPECIAL PURPOSE MICROPROCESSOR SUBSYSTEM. THE SCOPE OF WORK INCLUDES DESIGN UPGRADE OF EXISTING OPTICAL BENCH COMPONENTS AND MICROPROCESSOR ELECTRONICS SUBSYSTEM TO HELICOPTER FLIGHT REQUIREMENTS AND FLIGHT TEST OF DATA ACQUISITION SYSTEMS TO OBTAIN DATA FOR PREDICTIVE ALGORITHM DESIGN AS WELL AS REAL TIME DIGITAL MICROPROCESSOR DESIGN AND FABRICATION. THE FINAL PRODUCT IS A PROTOTYPE DYNAMIC BORESIGHT MENSURATION AND PREDICTION SYSTEM SUITABLE FOR OPERATION IN THE ONBOARD HELICOPTER FLIGHT ENVIRONMENT.

MACHINE DESIGN ENGINEERS INC AF
714 S HOMER ST
SEATTLE, WA 98108
DENNIS P MARTIN
TITLE:
A CONTINUOUS EXPLOSIVE TUNNELING SYSTEM
TOPIC: 106 OFFICE: AFBMO PMX

THE NEED EXISTS FOR AN ADVANCEMENT IN EXPLOSIVE EXCAVATION METHODS TO IMPROVE THE EXISTING CYCLIC PROCESS. PHASE II OF THIS PROJECT WILL DEVELOP THE COMPONENTS OF AN INNOVATIVE EXPLOSIVES EXCAVATION SYSTEM WHICH WILL COMBINE THE AUTOMATION OF TUNNEL BORING MACHINES WITH THE LOW ENERGY AND FLEXIBILITY OF EXPLOSIVES. THE SYSTEM WILL INCLUDE A CONTINUOUS, CONCURRENT CYCLE OF DRILLING, LOADING, BLASTING AND MUCK REMOVAL. THE PHASE I WORK INCLUDED DEMONSTRATION OF AN INNOVATIVE SOLUTION TO THE PROBLEM OF EXPLOSIVE DETONATION IN AUTOMATED SYSTEMS. THE CROSS-SECTION AND DIRECTOR OF THE TUNNEL OR SHAFT WILL BE VARIBLE. THE SYSTEM WILL BE ESPECIALLY SUITED TO THE LOW MECHANICAL POWER NEEDS OF A DEEP BASE. THE PHASE II WORK WILL INCLUDE DEVELOPMENT OF PROTOTYPE COMPONENTS, REFINEMENT OF THE SELECTED EXPLOSIVES, FIELD AND LABORATORY BLASTING TESTS, HOLE PATTERN VALIDATION TESTS AND THE DESIGN AND LAYOUT OF A MACHINE TO PERFORM THE AUTOMATED DRILL AND BLAST OPERATION.

MATERIALS SCIENCES CORP ARMY
GWYNEDD PLAZA II - BETHLEHEM PIKE
SPRING HOUSE, PA 19477
V RAMNATH/S N CHATTERJEE
TITLE:
COMPOSITE SPECIMEN DESIGN ANALYSIS
TOPIC: 79 OFFICE: MTL LAB COM

PROBLEMS WITH TESTING FIBROUS COMPOSITES ARISE DUE TO (1) NON-

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UNIFORM STRESS STATES; (ii) INHOMOGENEITY AND ANISOTROPY OF INDIVIDUAL LAMINAE; (iii) VARIOUS COUPLING EFFECTS BETWEEN THE STRESS COMPONENTS; AND (iv) THE OCCURENCE OF FAILURE DUE TO VARIOUS FAILURE MODES. THESE LEAD TO VARIOUS INCONSISTENCIES IN TEST DATA AND LACK OF RELIABILITY IN GENERATED DESIGN ALLOWABLES. A COMBINED ANALYTICAL AND EXPERIMENTAL PROGRAM IS PROPOSED WITH THE FOLLOWING OBJECTIVES: (i) TO DETERMINE APPROPRIATE TEST METHODS AND OPTIMIZED SPECIMEN GEOMETRIES FOR TENSION, COMPRESSION AND SHEAR TESTS; (ii) TO STUDY COMBINED STRESS EFFECTS SUCH AS SHEAR/TRANSVERSE TENSION USING NONLINEAR LAMINATE ANALYSIS PROCEDURES; (iii) TO ANALYZE AND RECOMMEND APPROPRIATE TEST METHODS FOR INTERLAMINAR FRACTURE TOUGHNESS MEASUREMENTS; AND (v) TO SUGGEST SUITABLE AND SIMPLE DATA INTERPRETATION METHODS. TESTS AND ANALYSES WILL BE DONE ON BOTH UNIDIRECTIONAL MATERIALS AS WELL AS SELECTED LAMINATE CONFIGURATIONS. COMBINED STRESS STUDIES ARE PROPOSED SO THAT IN ADDITION TO DETERMINING LAMINA BEHAVIOR UNDER UNIAXIAL STRESSES, PREDICTIONS OF LAMINATE BEHAVIOR CAN BE MADE. THE RESULTS OF THE STUDY WILL HENCE BE MORE GENERALLY APPLICABLE.

MERIX CORP ARMY
192 WORCESTER ST
WELLESLEY, MA 02181
THOMAS W MIX
TITLE:
RESIDUAL LIFE INDICATOR FOR A GAS MASK
TOPIC: 21 OFFICE: CRDC

U.S. MILITARY FORCES NEED PROTECTION AGAINST CHEMICAL WARFARE AGENTS SHOULD THESE BE DEPLOYED AGAINST THEM IN SOME FUTURE CONFLICT. TO THIS END, AN EFFECTIVE GAS MASK HAS BEEN DEVELOPED WHICH PROVIDES RESPIRATORY PROTECTION AGAINST ALL KNOWN MILITARY TOXIC CHEMICAL AGENTS. THE MASK USES WHETLERITE, A FINELY GROUND IMPREGNATED ACTIVATED CARBON, TO ADSORB AND NEUTRALIZE THE ACTIVE AGENTS FROM THE AIR PRIOR TO ITS INHALATION. FOR LARGE SHELTERS, AIR IS FORCED BY A FAN THROUGH A MECHANICAL COLLECTIVE PROTECTOR WHICH IS ESSENTIALLY A GREATLY ENLARGED VERSION OF A MASK CANISTER. A CURRENT NEED IS FOR A METHOD TO DETERMINE THE RESIDUAL SORPTIVE AND NEUTRALIZATION CAPACITY OF THESE AGENT FILTERS, AFTER THEY HAVE BEEN IN USE FOR SOME TIME. SUCH AN INDICATOR METHOD WILL INSURE PROPER PROTECTION OF PERSONNEL, AND WILL INCREASE THEIR MOBILITY AND DECREASE THEIR LOGISTICS REQUIREMENTS BY ENABLING THEM TO MAKE FULL USE OF THE CANISTERS AND FILTERS. A NOVEL COLORIMETRIC/ODOROUS INDICATOR, BASED ON TWO APPROACHES WHOSE FEASI-

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BILITIES WERE DEMONSTRATED IN A PHASE I SBIR, IS PROPOSED FOR DEVELOPMENT IN A PHASE II FOLLOW-ON.

METCUT RESEARCH ASSOCS INC AF
3980 ROSSLYN DR
CINCINNATI, OH 45209
R RAJ AGGARWAL
TITLE:
UNATTENDED PRECISION GRINDING PROCESS DEVELOPMENT
TOPIC: 18 OFFICE: ASD/YZ

*THE UNATTENDED PRECISION GRINDING STATION ADDRESSES A NEED FOR HIGH VOLUME, HIGH PRECISION GRINDING OF PROPULSION SYSTEM PARTS. REALIZATION OF THE UNATTENDED GRINDING STATION IS DEPENDENT UPON THE DEVELOPMENT AND IMPLEMENTATION OF THE RELATIONSHIPS FOR ADAPTIVE CONTROL OF WHEEL-AND-WORKPIECE STIFFNESS, DAMPING, AND COMPLIANCE IN THE GRINDING PROCESS. THE MEASUREMENT AND CONTROL OF THESE PARAMETERS HAS NOT BEEN PRACTICAL TO DATE. THE PROPOSED RESEARCH GOES BEYOND FORCE-ADAPTIVE AND ENERGY-ADAPTIVE GRINDING. USING MOTION SENSORS AND REAL-TIME ANALYSIS OF WHEEL-WORKPIECE MACHINE DYNAMICS, THE RESEARCH SEEKS TO EFFECT ACTIVE CONTROL OF THE SPINDLE. SUCH A CONTROL CAN BE ACHIEVED IN A MAGNETIC BEARING BY ALTERING THE MAGNETIC FIELDS WHICH SUSPEND IT. THE PROPOSED RESEARCH (PHASE I) WILL IDENTIFY WHAT CONTROL ALGORITHMS AND RULES FOR THE APPLICATION OF ARTIFICIAL INTELLIGENCE ARE APPROPRIATE FOR THE CREATION OF A HIGH PRECISION UNATTENDED GRINDING STATION. FURTHERMORE, THE SUITABILITY OF THE MAGNETIC BEARING SPINDLE WILL ALSO BE DETERMINED. A SELECTED MACHINE-TOOL BUILDER AND MAGNETIC BEARINGS INC. WILL BECOME PART OF THE TEAM.

MICRO-GENE-SYS INC ARMY
400 RONTAGE RD
W HAVEN, CT 06516
DR MARK A COCHRAN
TITLE:
PRODUCTION OF RECOMBINANT PROTEINS FOR USE IN SUBUNIT V
AGAINST JAPANESE ENCEPHALITIS AND DENGUE VIRUS
TOPIC: 97 OFFICE: MED R&D

HAVING DEMONSTRATED THE UTILITY OF THE BACULOVIRUS EXPRESSION SYSTEM, WE PROPOSE TO USE IT TO DESIGN SUBUNIT VACCINES TO PROTECT AGAINST DISEASES OF INTEREST TO THE MILITARY. WE HAVE CHOSEN TO PRODUCE

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PROTEINS THAT HAVE THE POTENTIAL TO ELICIT A PROTECTIVE IMMUNITY TO CERTAIN FLAVIVIRUSES, SPECIFICALLY, JAPANESE ENCEPHALITIS VIRUS AND DENGUE VIRUS. WE PROPOSE TO CONSTRUCT FOUR RECOMBINANT BACULOVIRUSES WHICH EXPRESS THE E AND NS1 GENES OF BOTH OF THESE VIRUSES. A MAJOR FACTOR IN CHOOSING TO WORK WITH THIS GROUP OF VIRUSES IS THAT THEIR LIFE CYCLE INCLUDES MOSQUITO VECTORS. SINCE THE BACULOVIRUS EXPRESSION SYSTEM IS AN INSECT SYSTEM, IT MAY BE IDEALLY SUITED FOR EXPRESSION OF GENES OF INVERTEBRATE ORIGIN WHERE OTHER EXPRESSION SYSTEMS HAVE BEEN KNOWN TO FAIL.

MICROCIRC ASSOCS AF
102 SCHOLZ PLAZA 238
NEWPORT BEACH, CA 92663
DR TEGZE P HARASZTI
TITLE:
INTELLIGENT FAULT-TOLERANT MEMORIES FOR MASS STORAGE DE
TOPIC: 131 OFFICE: AFSTC OLAB

NOVEL INTELLIGENT FAULT-TOLERANT SEMICONDUCTOR MEMORY CIRCUITS FOR FUTURE MASS DATA STORAGE DEVICES ARE PROPOSED FOR RESEARCH AND DEVELOPMENT. THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP 1.7X10(9) BIT MASS STORAGE DEVICES FOR A MINIMUM OF 7 YEARS MAINTENANCE-FREE SPACE OPERATION AS REPLACEMENTS FOR MECHANICAL MAGNETIC TAPE RECORDERS. THE RESULTS OF PHASE I RESEARCH EFFORTS HAVE DEMONSTRATED THAT THE PROPOSED CMOS MASS STORAGE DEVICE IS CAPABLE OF COMBINING THE REQUIRED LARGE STORAGE CAPACITY WITH LONG MAINTENANCE-FREE LIFE TIME IN CONTINUOUS OPERATION OF 10 YEARS, RADIATION HARDNESS OF 1 X 10(6) RAD (SI), HIGH OPERATIONAL SPEED OF 70(-250)MHz, LOW POWER DISSIPATION OF 4W, SMALL SIZE OF ~ 15 X 15 cm, AND A LIGHT WEIGHT OF ~ 6 kg. MOREOVER, THE NOVEL CMOS MASS STORAGE DEVICE PROVIDES AN EXTREMELY HIGH RELIABILITY OPERATION, NONVOLATILE STORAGE AND MANUFACTURABILITY WITH OPTIMIZED YIELD. IN PHASE II WE INTEND TO INVESTIGATE EXPERIMENTAL CMOS MEMORY CHIPS AND MODULES, AND DEVELOP A COMPLETE SPACE-BORNE MASS STORAGE DEVICE. PHASE II EFFORTS WILL INCLUDE FURTHER RESEARCH IN ERROR CONTROL OF MOS MEMORIES, AND DEVELOPMENT DESIGN, FABRICATION AND TEST OF MEMORY CIRCUITS. THE TECHNICAL APPROACH IS BASED ON A UNIQUE COMBINATION OF ERROR-CONTROL CODING (ECC) AND ASSOCIATIVE ITERATIVE REPAIR (AIR).

[illegible] NAVY
[illegible]
WARMINSTER, PA [illegible]
MICHAEL DOHERTY
TITLE:
[illegible] DOPPLER
TOPIC: [illegible] OFFICE: NAVAIR (MI)

*VIDEO DOPPLER INFORMATION IS A MAJOR REQUIREMENT TO EVALUATE THE

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PERFORMANCE OF MANY AIRCRAFTS AND GROUND LAUNCHED MISSILES. IT IS THE PARAMETER WHICH IS MOST GUARDED IN MISSILE TESTING BECAUSE IT PROVIDES THE ULTIMATE ANSWER TO THE SUCCESS OF THE FIRING. UNDER THE PRESENT CLIMATE, THE AIRCRAFT AND MISSILE INDUSTRIES WILL BE REQUIRED TO SECURE THEIR TELEMETRY DATA. THIS FEASIBILITY STUDY WILL PROVIDE THE TECHNICAL INFORMATION AS TO THE BEST APPROACH TO THE SOLUTION OF VIDEO DOPPLER DATA WITH RESPECT TO THE SECURE TM REQUIREMENTS.

MICROWAVE MONOLITHICS INC AF
465 E EASY ST
SIMI VALLEY, CA 93065
DANIEL P SIU
TITLE:
ADVANCED GaAs FET FOR LOW NOISE MICROWAVE AND MILLIMETE
WAVE MMIC FREQUENCY SOURCES
TOPIC: 196 OFFICE: AFOSR/XOT

GaAs MESFET TECHNOLOGY, IN SPITE OF ITS SUCCESS IN A VARIETY OF DISCRETE AND MONOLITHIC MICROWAVE INTEGRATED CIRCUITS (MMIC'S), IS NOT SATISFACTORY FOR OSCILLATOR APPLICATIONS DUE TO THE OBSERVED EXCESSIVE FM NOISE COMPARED TO Si BIPOLAR TRANSISTOR AND GUNN DIODE COMPONENTS. Si BIPOLAR TRANSISTOR AND GUNN DIODES ARE, HOWEVER, NOT SUITABLE FOR MONOLITHIC INTEGRATION AT MICROWAVE FREQUENCIES. THE HIGHER FM NOISE OF GaAs MESFET OSCILLATORS IS ATTRIBUTED TO THE 1/F NOISE OF THE GaAs FET DEVICES. MICROWAVE MONOLITHICS INCORPORATED HAS DEVELOPED A PROPRIETARY FLASH ANNEALING TECHNIQUE WHICH SUBSTANTIALLY REDUCES THE 1/F NOISE OF GaAs FET DEVICES. UNOPTIMIZED DEVICES WERE FABRICATED AND CHARACTERIZED IN PROGRAM PHASE I, AND EXHIBITED A 1/F NOISE CORNER FREQUENCY BELOW 2 MHz-AN ORDER OF MAGNITUDE LOWER THAN STANDARD GaAs MESFETs. IN PROGRAM PHASE II, THESE DEVICES WILL BE OPTIMIZED AND INCORPORATED IN A HIGH PERFORMANCE X-BAND LOW PHASE NOISE OSCILLATOR. FOLLOWING OSCILLATOR FABRICATION AND CHARACTERIZATION, AN ASSESSMENT OF PHASE LOCKING CAPABILITIES WILL BE MADE. FINALLY, A MILLIMETER-WAVE OSCILLATOR AT A TBD FREQUENCY WILL BE DESIGNED FOR LOW PHASE NOISE APPLICATIONS.

MISSION RESEARCH CORP AF
1720 RANDOLPH RD SE
ALBUQUERQUE, NM 87106
ROBERT T RICHTER-SAND
TITLE:
X-RAY SMEAR CAMERA
TOPIC: 186 OFFICE: AFATL/MNE

MISSION RESEARCH PROPOSES TO PERFORM TO THE BEST OF ITS ABILITY THE

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DEVELOPMENT OF AN INTEGRATED LONG PULSE RADIOGRAPHY SYSTEM FOR EXPLOSIVE ORDNANCE RESEARCH. THE SBIR PHASE I STUDY PRODUCED A LIKELY DESIGN OF A 500 keV, 25 MICROSEC, 1 kA PULSER. THE OUTPUT VOLTAGE IS DRIVEN BY A 20 STAGE, 75 kV PULSE FORMING NETWORK (PFN) WHICH IS COUPLED TO A 1.11 HIGH VOLTAGE TRANSFORMER. THE BEAM CURRENT IS PRODUCED BY A FLASHOVER PLASMA. THE ELECTRON FLUX MUST BE ADEQUATELY FOCUSED TO AN EFFECTIVE POINT BREMSSTRAHLUNG SOURCE FOR RADIOGRAPHY. CONCURRENT WITH THE R&D OF THE X-RAY PULSER, THE STREAK CAMERA PRESENTED IN THE PHASE I EFFORT WILL BE CONSTRUCTED. ADAPTING THE CAMERA TO SUBMICROSECOND FRAMING WILL ALSO BE EXPLORED. MISSION RESEARCH CORPORATION WILL DELIVER THE INTEGRATED SYSTEM TO EGLIN AFB ARMAMENT DIVISION FOR ORDNANCE DIAGNOSTIC APPLICATION.

MISSION RESEARCH CORP AF
PO DRAWER 719 - 735 STATE ST
SANTA BARBARA, CA 93102
DR ROGER A DANA
TITLE:
SHF/EHF SATELLITE LINK PERFORMANCE AND MITIGATION
TOPIC: 128 OFFICE: AFBMO/PMX

THE OBJECTIVES OF THE EFFORT PROPOSED HERE ARE TO DEVELOP A HIGH FIDELITY SIMULATION OF GENERIC SHF/EHF SATELLITE COMMUNICATIONS LINKS THAT MUST OPERATE IN NUCLEAR SCINTILLATION AND DUST ENVIRONMENTS AND TO USE THIS SIMULATION TO QUANTIFY LINK PERFORMANCE AND TO DEVELOP MITIGATION TECHNIQUES. SECONDARY OBJECTIVES ARE TO BEGIN THE DEVELOPMENT OF A SIGNAL SPECIFICATION FOR SHF/EHF NUCLEAR DUST EFFECTS AND TO PROVIDE DESIGN RECOMMENDATIONS FOR SURVIVABLE SHF/EHF SATELLITE COMMUNICATIONS LINKS. EXISTING SHF/EHF COMMUNICATIONS SYSTEM DESIGNS WILL BE REVIEWED AND REPRESENTATIVE WAVEFORMS WILL BE SELECTED. LINK PERFORMANCE WILL BE CALCULATED USING THE DEFENSE NUCLEAR AGENCY NUCLEAR SCINTILLATION SIGNAL SPECIFICATION DATA COMPILED UNDER PHASE I OF THIS EFFORT. DUST EFFECTS WILL BE INCLUDED PARAMETRICALLY USING THE BEST AVAILABLE NUCLEAR DUST MODELS. UNCERTAINTIES IN NUCLEAR PHENOMENOLOGY THAT IMPACT PERFORMANCE WILL BE IDENTIFIED AS FURTHER RESEARCH TOPICS.

NATIONAL TECHNICAL SYS NAVY
1650 S PACIFIC COAST HWY - STE 200
REDONDO BEACH, CA 90277
DR TOMASZ JANNSON
TITLE:
NON-DESTRUCTIVE INSPECTION OF BONDED METALLIC/ELASTOMER
INTERFACES BY OPTICAL SHEAROGRAPHY
TOPIC: 80 OFFICE: NSWC

[illegible] TO EXPLORE A NEW OPTICAL APPROACH REFERRED TO AS

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SHEAROGRAPHY FOR NONDESTRUCTIVE INSPECTION OF BONDED METALLIC/ELASTOMERIC INTERFACES. SHEAROGRAPHY IS EQUIVALENT TO A FULL-FIELD STRAIN GAGE; IT REVEALS DEFECTS BY LOOKING FOR DEFECT-INDUCED STRAIN ANOMALIES. THIS APPROACH IS SUPERIOR TO OTHER TECHNIQUES IN THAT IT ALLOWS DEFECT CRITICALITY TO BE QUANTIFIED. MOREOVER, IT IS A FAST, NON-CONTACTING, AND FULL-FIELD METHOD. THE ULTIMATE GOAL IS TO DEVELOP SHEAROGRAPHY TO BECOME A GENERAL PURPOSE NONDESTRUCTIVE INSPECTION TOOL.

NIAGARA SCIENTIFIC INC AF
4004 NEW COURT RD
SYRACUSE, NY 13206
DR SYLVAN Z BEER
TITLE:
CW-AGENT FILTER UTILIZATION MONITOR
TOPIC: 72 OFFICE: AMD/RDO

NO PHASE II ABSTRACT AT THIS TIME

NICHOLS RESEARCH CORP AF
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
ANDREW T TEXTORIS
TITLE:
IMPLICATIONS OF OPEN DATA RELEASE ON STRATEGIC SYSTEMS
TOPIC: 75 OFFICE: AFBMO/PMX

OPEN LITERATURE SOUCES ROUTINELY CONTAIN INFORMATION ON U.S. STRATEGIC MISSILE SYSTEM. UNDER THE PHASE I EFFORT, NRC IDENTIFIED: SPECIFIC INFORMATION WHICH HAS BEEN RELEASED; THE VALIDITY OF THE INFORMATION AND WHETHER ITS VALIDITY COULD BE VERIFIED; AND HOW THE INFORMATION COULD BE USED TO DEVELOP A DEFENSE AGAINST THE U.S. SYSTEM. THE OBJECTIVE OF THE PHASE II EFFORT IS TO DEVELOP A METHODOLOGY FOR QUANTIFYING THE IMPORTANCE OF SPECIFIC DATA ELEMENTS AND TO DEVELOP A PRIORITIZED LIST OF SPECIFIC DATA WHICH SHOULD NOT BE RELEASED.

NICHOLS RESEARCH CORP AF
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
ROGER TIPPETS
TITLE:
OPTICAL MASKING MODELING TECHNIQUES AND ANALYSIS
TOPIC: 79 OFFICE: AFBMO/PMX

IMPLEMENTATION OF THE RESULTS OF THE PHASE I EFFORT INTO AN EXISTING

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AEROSOL SIMULATION WILL IMPROVE PREDICTION CAPABILITY OF THIS MASKING TECHNIQUE. PHENOMENA TO BE INCORPORATED INCLUDE AGGLOMERATION, MATERIAL COATING, THERMAL, AND REALISTIC DRAG MODELS. ADDITIONALLY, THE CODE WILL BE EXTENDED TO INCLUDE SCATTERING EFFECTS FOR CYLINDRICAL OBJECTS. PERFORMANCE ANALYSES WILL BE DONE TO DETERMINE UTILITY OF AEROSOLS FOR MASKING OBJECTS WITH THE UPDATED CODE AND UTILITY OF PROMISING NEW MATERIAL COMPOSITIONS OR MASKING AEROSOLS.

NICHOLS RESEARCH CORP NAVY
4100 BIRCH ST - STE 100
NEWPORT BEACH, CA 92660
GREGORY R McNEIL
TITLE:
CLUTTER SUPPRESSION PROCESSING FOR INFRARED SEARCH AND TRACK
TOPIC: 101 OFFICE: NSWC

*THE DETECTION OF TARGETS IN BACKGROUND CLUTTER WITH AN IRST IS A KEY FUNCTION FOR SUPPORTING U.S. NAVAL SURVEILLANCE ACTIVITIES. THIS INVOLVES THE EXTRACTION OF TARGETS FROM BACKGROUND WHOSE RADIANCE MEANS AND STANDARD DEVIATIONS ARE MANY TIMES THAT OF THE TARGET. A SUCCESSFUL APPROACH, IN MANY CASES IS TO EMPLOY MTI TECHNIQUES TO EXTRACT THE TARGET FROM THE BACKGROUND. HOWEVER, PREPROCESSING TECHNIQUES ARE NEEDED TO REMOVE SCENE MOTION BEFORE THE APPLICATION OF MTI. THIS MAY REQUIRE THE APPLICATION OF SPATIAL FILTERING TECHNIQUES TO SEGMENT THE SCENE INTO REGIONS WHICH HAVE NEARLY THE SAME VELOCITY OF MOTION. THESE SCENE SEGMENTATION TECHNIQUES ARE CLOSELY RELATED TO THE TACTICAL IMAGE PROCESSING APPROACHES EMPLOYED BY NRD IN THE EXTRACTION OF STATIONARY TARGETS. OTHER TECHNIQUES, SUCH AS EDGE ENHANCEMENT PROCESSES, ARE ALSO USEFUL IN SEPARATING SECTIONS OF THE SCENE. ONCE THESE SCENES ARE SO SEGMENTED, APPARENT MOTION IN THE SCENE CAN BE REMOVED BY PERFORMING TWO-DIMENSIONAL CORRELATIONS OF THE BACKGROUND IRRADIANCE. WITH THE REMOVAL OF APPARENT MOTION, FRAME-TO-FRAME SUBTRACTION FOLLOWED BY TRACK ASSOCIATION CAN BE EMPLOYED TO EXTRACT THE TARGET AND REJECT CLUTTER.

NICHOLS RESEARCH CORP INC NAVY
4040 S MEMORIAL PARKWAY
HUNTSVILLE, AL 35802
JOSEPH MUDAR
TITLE:
DECOY DEVELOPMENT
TOPIC: 11 OFFICE: MARCORPS

*THIS PROPOSAL DISCUSSES THE DESIGN AND ANALYSIS OF A MODULAR SYSTEM

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OF DECOYS. THE DECOYS WOULD SIMULATE THE VISIBLE, INFRARED, AND MICROWAVE SIGNATURES OF A VARIETY OF TACTICAL WEAPONS AND VEHICLES. THE DECOYS WOULD BE LIGHTWEIGHT, INEXPENSIVE AND EASILY DEPLOYABLE.

NIELSEN ENGINEERING & RESEARCH INC NAVY
510 CLYDE AVE
MOUNTAIN VIEW, CA 94043
DR MARNIX F E DILLENIUS
TITLE:
DESIGN PROCEDURE FOR AEROELASTICALLY TAILORED MISSILE C SURFACES
TOPIC: 62 OFFICE: NAVAIR

*A PROCEDURE IS PROPOSED FOR THE DESIGN OF MISSILE CONTROL SURFACES USING AEROELASTIC TAILORING TO ENHANCE THEIR PERFORMANCE. THE PRINCIPAL GOAL OF THE PROCEDURE IS TO MINIMIZE THE VARIATION OF THE CHORDWISE POSITION OF THE AERODYNAMIC CENTER OF PRESSURE A THE SURFACE DEFORMS UNDER LOAD. OTHER PERFORMANCE OBJECTIVES, SUCH AS MAINTAINING OR IMPROVING MARGINS OF SAFETY AGAINST FLUTTER, CAN ALSO BE INCORPORATED. THE PURPOSE OF THE PRESENT RESEARCH IS TO DEVELOP THE PROCEDURE FOR SUPERSONIC SPEEDS AND EVALUATE IT BY COMPARING AN AEROELASTICALLY TAILORED COMPOSITE FIN DESIGN WITH A CONVENTIONAL DESIGN. SUCCESSFUL COMPLETION OF THIS PHASE I WORK IS EXPECTED TO LEAD TO FABRICATION AND EXPERIMENTAL EVALUATION OF THE DESIGN IN A SUPERSONIC WIND TUNNEL IN PHASE II.

NOISE COM INC ARMY
111 MOORE ST
HACKENSACK, NJ 07601
KURT STERN
TITLE:
POWER/FREQUENCY ADAPTIVE AMPLIFIERS AND TRANSMITTERS
TOPIC: 52 OFFICE: CECOM/SWL

NO ABSTRACT FOR NOISE COM INC

NW SYSTEMS SDIO
2507 BROWNCROFT BLVD - STE 105
ROCHESTER, NY 14625
DR CAROL A NIZNIK
TITLE:
STRATEGIC DEFENSE DATA BASE TRANSFER SOFTWARE TOOL FOR TIME OPTIMAL TRANSMISSION OF WORSE CASE THREAT DATA
TOPIC: 4 OFFICE: IST

NO ABSTRACT FOR NW SYSTEMS

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OCEAN & ATMOSPHERIC SCIENCE INC NAVY
145 PALISADE ST
DOBBS FERRY, NY 10522
DR FREDRICK COTTON
TITLE:
DESIGN AND IMPLEMENTATION OF A SUPERCONDUCTING ACOUSTIC PROJECTOR
TOPIC: 129 OFFICE: NAVSEA/NUSC

*A DESIGN IS PROPOSED FOR A CRYOGENIC ACOUSTIC PROJECTOR FOR LOW FREQUENCY UNDERSEA COMMUNICATIONS OR SURVEILLANCE OVER LONG DISTANCES. ALTERNATIVELY THIS VIBRATIONAL POWER SOURCE COULD BE USED TO TEST THE PHYSICAL INTEGRITY OF STRUCTURES, TO DRIVE PILINGS, OR FOR OTHER INDUSTRIAL APPLICATIONS. ITS UNIQUE FEATURE IS A VERY HIGH POWER-TO-WEIGHT RATIO, EXCEEDING THAT OF ANY OTHER LOW FREQUENCY VIBRATIONAL SOURCE BY MORE THAN A FACTOR OF TEN. THE PROPOSED PHASE I EFFORT SEEKS TOP BALANCE THE SYMMETRICAL DRIVES TO THE TWO END PLATES, NULL OUT UNWANTED VIBRATIONS, REDUCE EDDY CURRENTS BY DESIGNING COIL MOUNTS OF NON-CONDUCTING MATERIALS, PROPERLY MATCH THE STIFFNESS OF THE VIBRATING DIAPHRAGMS TO THAT OF THE COIL MOUNTS, DESIGN AND BUILD ELECTRONICS POWER SUPPLIES WITH ADAPTIVE FEEDBACK CONTROL ON THE AC DRIVES TO MAINTAIN PROPER BALANCE, AND TO DESIGN THE SUPER CONDUCTING DC COIL AND ITS ASSOCIATED ELECTRONICS. THE WORK PLAN INCORPORATES THE DESIGN AND CONSTRUCTION OF MOST OF THESE COMPONENTS, THEIR ASSEMBLY INTO THE PROJECTOR, AND REPEATED TESTING OF THE ASSEMBLED PROJECTOR IN AIR AND IN WATER TO EVALUATE EACH COMPONENT DESIGN. A CALIBRATED ACCELEROMETER SYSTEM WILL PERMIT MEASUREMENT OF FREQUENCY RESPONSE, Q AT RESONANCE, PISTON DISPLACEMENTS, POWER OUTPUT, AND UNWANTED VIBRATIONAL MODES.

OCEANOGRAPHIC SERVICES INC NAVY
25 CASTILIAN DR
SANTA BARBARA, CA 93117
R WALLERSTEDT
TITLE:
SUBMARINE ICE THICKNESS AND PROFILING SYSTEM
TOPIC: 124 OFFICE: NWSC

*A PHASE I STUDY IS PROPOSED TO VERIFY THE TECHNICAL FEASIBILITY AND REFINE THE CONCEPT DESIGN FOR A SUBMARINE-INSTALLED ICE THICKNESS AND PROFILING MEASUREMENT SYSTEM. THE SYSTEM IN REAL-TIME WILL PROVIDE A CONTINUOUSLY UPDATED 3-D DISPLAY OF THE UNDER-ICE SURFACE PLUS ACCURATE MEASUREMENT OF ICE THICKNESS. THE SYSTEM PROVIDES IMMEDIATE

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AND NECESSARY INFORMATION FOR THROUGH-ICE DEPLOYMENT AND FOR HIGH-SPEED MANEUVERS UNDER THE PACK ICE. THE DESIGN CONCEPT IN A MORE SIMPLIFIED FORM, HAS DIRECT APPLICATION TO SEABED DEPLOYED ICE MEASUREMENT EQUIPMENT. THE PROPOSED SYSTEM UTILIZES A VARIABLE LOW-FREQUENCY PARAMETRIC SONAR APPROACH TO DETERMINE THE OVERHEAD ICE THICKNESS. THE SYSTEM ALSO DEPICTS A REAL-TIME 3-D PROJECTION OF THE UNDER-ICE SURFACE. THE ESTIMATED PROFILING RANGE AND ICE THICKNESS CAPABILITY ARE 1,000 METERS TO 10 METERS, RESPECTIVELY. SUCCESSFUL COMPLETION OF PHASE I WOULD LEAD INTO A BREADBOARD DEMONSTRATION AND PRELIMINARY DESIGN PREREQUISITE TO OPERATIONAL DEPLOYMENT.

OLIS ENGINEERING ARMY
PO BOX 408D
SEDALIA, CO 80135
CARTER K LORD
TITLE:
ADVANCED DEVELOPMENT - WASTE PROCESSING UNIT FOR COMBAT
TOPIC: 72 OFFICE: TACOM

THE PROPOSED PHASE II RESEARCH WILL RESULT IN THE DESIGN, FABRICATION AND TESTING OF TWO WASTE PROCESSING UNITS (WPU's) - ONE SPECIFICALLY DESIGNED FOR USE IN THE CONCEPT COMMAND POST VEHICLE (CCPV), AND THE OTHER DESIGNED FOR COMMERCIAL AND MILITARY MARINE APPLICATIONS. A WPU TEST STAND WILL BE DESIGNED AND FABRICATED TO FACILITATE TESTING OF THE EXISTING WPU BENCH MODEL (#WPU-BM001) AND THE WPU DEVELOPMENT UNITS PROPOSED. WASTE INTRODUCTION SYSTEMS TO PERMIT THE INSERTION OF WASTE MATERIAL INTO THE WPU WILL BE DESIGNED AND FABRICATED FOR EACH UNIT. UPON COMPLETION OF THE WPU DEVELOPMENT TESTS, THE WPU DEVELOPMENT UNITS WILL BE REFURBISHED, AND THE UNIT FOR COMBAT VEHICLES WILL BE INSTALLED INTO THE CCPV FOR FURTHER TESTING UNDER ACTUAL CONDITIONS.

OMUTEC ODETICS INC NAVY
1515 S MANCHESTER AVE
ANAHEIM, CA 92802
ROBERT LINDNER
TITLE:
MATERIAL APPLICATION STUDY FOR VERY LOW FREQUENCY HYDRO
TOPIC: 104 OFFICE: NSWC

*A REQUIREMENT EXISTS FOR THE DETECTION AND IDENTIFICATION OF UNDER-WATER ACOUSTICS OF VERY LOW FREQUENCIES AT EXTREMELY LOW AMPLITUDES

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IN AMBIENT WATER PRESSURES OF 3000 TO 5000 psi. THE GENERATED OUTPUT FROM THE BASIC SENSOR MUST PRODUCE A NOISE FREE SIGNAL LEVEL OF SUFFICIENT AMPLITUDE SUITABLE FOR SIGNAL CONDITIONING FOR TELEMETERING TO SHIP, SHORE OR SATELLITE. DEVELOPMENT BY OMUTEC, ODETICS HAS BEEN IN PROGRESS USING A PIEZOELECTRIC SENSOR AND A CHARGE AMPLIFIER; HOWEVER, DUE TO JOHNSON NOISE OR PYROELECTRIC EFFECTS IN PIEZOELECTRIC CRYSTALS, THERMAL ISOLATION IS REQUIRED TO ELIMINATE DRIFT DUE TO TEMPERATURE CHANGES. THE HYDROPHONIC TRANSDUCER IS CAPABLE OF OPERATING AT DEPTHS OF UP TO 10,000 FEET AND CAN DETECT PRESSURE VARIATIONS OF .00142 psi AND HAS A BANDWIDTH RESPONSE FROM .03 hz TO 10KHz. AN ANALYSIS OF MAGNETOELASTIC MATERIAL INDICATES THAT IT WOULD HAVE DISTINCT ADVANTAGES OVER PIEZOELECTRIC CRYSTALS FOR LOW FREQUENCY SENSITIVITY AND TEMPERATURE STABILITY.

ONTAR CORP NAVY
129 UNIVERSITY RD
BROOKLINE, MA 02146
JOHN SCHROEDER
TITLE:
INFRARED CLOUD/SEA MODELING AND UNDERLYING FUNDAMENTAL
TOPIC: 102 OFFICE: NSWC

*THE NAVY IS CURRENTLY DEVELOPING A PASSIVE INFRARED SYSTEM FOR FLEET DEFENSE TO DETECT AIRBORNE TARGETS AGAINST A CLUTTER BACKGROUND. THE BACKGROUND MEASUREMENT AND ANALYSIS PROGRAM (BMAP) IS SUPPORTING THIS EFFORT IN THE ACQUISITION AND ANALYSIS OF ARCHIVAL QUALITY IMAGERY DATA OF CLOUD AND SEA CLUTTER BACKGROUNDS. THE PROPOSED PROGRAM WILL PROVIDE BMAP WITH THE OVERALL ARCHITECTURE AND MODULES FOR A MULTIFUNCTIONAL, USER-INTERACTIVE CODE TO MODEL BACKGROUNDS, AND EVALUATE SIGNAL PROCESSING CLUTTER SUPPRESSION TECHNIQUES. THE PHENOMENOLOGICAL PART OF THE CODE WILL INCORPORATE SIMPLE CLOUD AND SEAL RADIANCE MODELS THAT ARE BASED ON THE UNDERLYING PHYSICS AND CELLULAR AUTOMATA WILL BE USED TO DEVELOP A SPATIAL AND TEMPORAL CLUTTER MODEL BASED ON THE FLUID DYNAMIC PROPERTIES OF CLOUDS. THE BMAP INFRARED SYSTEMS CODE (BISC) WILL SUPPORT MEASUREMENT PLANNING, DATA VALIDATION, CLUTTER CHARACTERIZATION AND PROVIDE THE FRAMEWORK TO EVALUATE CANDIDATE IRST CONCEPTS.

ONTEK CORP (OLD: REYNOLDS & TAYLOR INC) AF
311 E ALTON AVE
SANTA ANA, CA 92707
CHARLES W DEMENT
TITLE:
SEKOM: CONSTRUCTION OF AN AUTONOMOUS OPERATIONS MANAGE
AND SUPPORT SYSTEM
TOPIC: 60 OFFICE: AFWAL/ML

WE PROPOSE TO DESIGN, IMPLEMENT AND TEST A KNOWLEDGE-BASED SYSTEM

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FOR INTERACTIVE AND ..... OPERATIONS MANAGEMENT OF AEROSPACE MANUFACTURING, TERMED SEKOM-O, THAT ENCOMPASSES THE KEY TASKS OF PLANNING, SCHEDULING AND CONTROL OF OPERATIONS. THE OPERATIONS MANAGEMENT TASK IS INHERENTLY DIFFICULT; INCLUDED ARE CONSIDERATIONS SUCH AS FLEXIBILITY, PROFITABILITY, TRACEABILITY, QUALITY ASSURANCE AND ERROR DETECTION AND CORRECTION. THE KEY PROBLEM IS TO ENABLE INDEPENDENT DOMAIN-SPECIFIC SYSTEMS TO COMMUNICATE WITH EACH OTHER IN ORDER TO ALLOW COORDINATION AMONG OTHERWISE SEPARATE TASKS. OUR PROPOSED SOLUTION TO THIS PROBLEM OF COMMUNICATING EXPERT SYSTEMS IS THE ESTABLISHMENT OF A UNIFORM, CANONICAL REPRESENTATIONAL LSYSTEM, IN WHICH ALL REPRESENTATIONS AND DATA-STRUCTURES FOR EVERY CONSTITUENT EXPERT SYSTEM ARE IMPLEMENTED. THIS UNIFORM REPRESENTATION IS MADE POSSIBLE BY THE IDENTIFICATION OF REPRESENTATIONAL PRIMITIVE BUILDING BLOCKS WHICH ENSURE THAT THE RELATIONSHIPS BETWEEN ANY OBJECT OR EVENT ACROSS MORE THAN ONE DOMAIN CAN BE EXPLICITLY REPRESENTED, AS WELL AS ENABLING MULTIPLE DIFFERENT REPRESENTATIONS OF COMPLEX OBJECTS IN ORDER TO ALLOW THE TRACKING OF OBJECTS THROUGH THE MANUFACTURING ENVIRONMENT DURING OPERATIONS.

OPCOA NAVY
1201 N BROADWAY
SANTA ANA, CA 92701
DR WILLIAM H QUICK
TITLE:
HIGH ACCURACY FABRY-PEROT OCEAN TEMPERATURE SENSOR
TOPIC: 124 OFFICE: NWSC

*A HIGH-ACCURACY TEMPERATURE SENSOR--WITH IMMUNITY OF EMI--IS PROPOSED AS AN OCEAN TEMPERATURE MONITOR. THE SENSOR CONSISTS OF A BROADBAND LIGHT SOURCE COUPLED INTO AN OPTICAL FIBER WHICH TRANSMITS THIS BROADBAND SPECTRUM TO THE REMOTE SENSOR ELEMENT. THE SENSOR ELEMENT IS A VARIABLE GAP FABRY-PEROT CAVITY WHICH MODULATES THE REFLECTED SPECTRUM ACCORDING TO GAP DIMENSION. THE REFLECTED SPECTRUM IS FIBER-TRANSMITTED BACK TO A MICROPROCESSOR BASED, COLOR DEMODULATION SYSTEM. THIS COLOR DEMODULATION IS ACCOMPLISHED BY PRISM DISPERSION OVER A CHARGE-COUPLED-DEVICE (CCD). THE MICROPROCESSOR USES KALMAN FILTERING TO ANALYZE AND CONVERT THE SPECTRAL DATA TO TEMPERATURE.

OPHIR CORP ARMY
7333 W JEFFERSON AVE - STE 210
LAKEWOOD, CO 80235
LOREN D NELSON
TITLE:
AN ARMY TACTICAL WEATHER HYGROMETER
TOPIC: 30 OFFICE: LABCOM/ASL

THE PHASE I RESEARCH EFFORT LEAD TO A STRONG AND CLEAR DEMONSTRATION

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OF THE FEASIBILITY OF AN INFRARED TRANSMISSION HYGROMETER TO MEET ARMY REQUIREMENTS. SPECIFICIALLY THIS FEASIBILITY WAS DEMONSTRATED BY SUCCESSFULLY ADDRESSING THE THREE PHASE I TECHNICAL OBJECTIVES: (1) THEORETICAL STUDIES TO EXAMINE INSTRUMENT RESPONSE, (2) EXPERIMENTAL VERIFICATION OF INSTRUMENT RESPONSE, AND (3) RESEARCH TO EXPLORE DESIGN OPTIONS FOR A PRELIMINARY ENGINEERING DESIGN. THE PROPOSED PHASE II RESEARCH AND DEVELOPMENT EFFORT WOULD RESULT IN AN ARMY TACTICAL WEATHER INFRARED HYGROMETER WITH A UNIQUE COMBINATION OF FEATURES. THESE FEATURES INCLUDE NON-CONTACT OPERATION FOR RELIABILITY IN HARSH ENVIRONMENTS, FAST RESPONSE, HIGH RESOLUTION, AND OPERATION AT 100% RELATIVE HUMIDITY. THIS PROPOSAL IDENTIFIED A LONG LIST OF COMPLEX PHASE II HYGROMETER DESIGN OPTIONS. FURTHERMORE INTERACTION WITH THE ARMY'S ATMOSPHERIC SCIENCE LABORATORY (ASL) STAFF HAS DISCLOSED A NUMBER OF INSTRUMENT REQUIREMENTS WHICH ARE UNIQUE TO ARMY TACTICAL APPLICATIONS. IT IS THEREFORE CLEAR THAT AN OPTIMAL HYGROMETER DESIGN TO BEST MEET THE ARMY REQUIREMENTS COULD REALISTICALLY ONLY BE DEVELOPED THROUGH CLOSE COOPERATION WITH ASL SCIENTIFIC STAFF AS PART OF AN ARMY FUNDED PHASE II RESEARCH AND DEVELOPMENT EFFORT.

PDA ENGINEERING AF
[illegible]
SANTA ANA, CA [illegible]
EDWARD [illegible]
TITLE:
CARBON-CARBON MATERIAL PROPERTY SENSITIVITY
TOPIC: [illegible] OFFICE: AFRPL/TSTR

THE THERMOSTRUCTURAL PERFORMANCE SENSITIVITY OF NOZZLE TO CHANGES IN CARBON-CARBON COMPOSITE MATERIAL PROPERTIES HAS BEEN A SIGNIFICANT PROBLEM. THE PROPOSED STUDY WILL IDENTIFY CRITICAL PROPERTIES AND DEVELOP TEST DATA FOR CHARACTERIZING CHANGES IN THESE PROPERTIES AS A FUNCTION OF RAW MATERIAL, LAY-UP AND DENSIFICATION PROCESS. OUR OBJECTIVE IS TO CORRELATE NOZZLE SENSITIVITY CHANGES IN RAW MATERIALS AND COMPOSITE CONSTRUCTION ANALYTICALLY AND EXPERIMENTALLY THROUGH USE OF PROCESS-PROPERTY RELATIONS. THE PROJECT IS MULTI-DISCIPLINARY, MEANING THAT DESIGN, ANALYSIS AND MANUFACTURE, AND THEIR INTERACTIONS MUST ALL BE CONSIDERED. WE PROPOSE TO STUDY A BASELINE NOZZLE WITH CARBON-CARBON COMPONENTS MADE FROM GRAPHITE FABRIC WITH APPROXIMATELY TEN CRITICAL VARIATIONS ASSOCIATED WITH RAW MATERIALS, LAY-UP AND PROCESSING.

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PDA ENGINEERING AF
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
PAUL KOCHENDORFER
TITLE:
INTERNAL INSPECTION OF LONG TUBES
TOPIC: 211 OFFICE: AEDC/DOT

A REQUIREMENT EXISTS FOR THE PRECISION INSPECTION OF THE AEDC TRACK G FACILITY BETWEEN SHOTS TO SURVEY FOR DAMAGE AND/OR MISALIGNMENT OF THE TRACK RAILS AND FOR DAMAGE TO THE RECOVERY TUBE. A PRELIMINARY DESIGN FOR A MODULARIXED, SELF-CONTAINED INSPECTION SYSTEM WITH A DIGITAL DATA LOGGER AND MEMORY HAS BEEN DEVELOPED. THE PROPOSED INSPECTION SYSTEM INCLUDES (1) A TRACTOR DRIVE MODULE, (2) A TRACK INSPECTION MODULE, (3) A TUBE INSPECTION MODULE, AND (4) A TRACK MAINTENANCE MODULE. THIS MODULAR APPROACH CAN BE TAILORED TO PERFORM THE DESIRED INSPECTION AND/OR MAINTENANCE FUNCTION AT ANY LOCATION IN THE TRACK G FACILITY OR FOR ITS ENTIRE LENGTH. THE TRACTOR-DRIVEN INSPECTION MODULES EACH USE LINEAR VARIABLE DIFFERENTIAL TRANSFORMERS (LVDT) TO MEASURE ACCURATELY THE DISTANCE BETWEEN OPPOSING RAILS (OR TUBE DIAMETER), INCLUDING LOCALIZED PERTURBATIONS GREATER THAN + OR - 0.0001. IN THE PHASE I PROGRAM, TESTS WERE PERFORMED TO MEASURE THE EFFECTIVENESS AND REPORTABILITY OF THESE LVDT'S ON BOTH AN ACTUAL 10 FT SECTION OF GUIDED RAIL TRACK AND ON A RAIL SECTION WITH SIMULATED DAMAGE. THE RESULTS OF THESE TESTS SHOWED THAT THIS METHOD IS A VIABLE APPROACH TO AUTOMATED INSPECTION OF BOTH THE RANGE G TRACK AND RECOVERY TUBE SECTIONS. A PHASE II PROGRAM IS PROPOSED TO COMPLETE THE DESIGN, FABRICATION AND EVALUATION OF THE SELF-CONTAINED INSPECTION DEVICE.

PDA ENGINEERING/SHANEST INC ARMY
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
NICHOLAS J DELOLLIS
TITLE:
PLASMA TREATMENT OPTIMIZATION OF POLYARAMID FILAMENTS T
IMPROVE KEVLAR/EPOXY COMPOSITES
TOPIC: 78 OFFICE: MTL/LABCOM

PLASMA TREATMENT OF POLYARAMID FILAMENTS HAS CREATED IMPROVED KELVAR/EPOXY COMPOSITES. SURFACE CHEMICAL MODIFICATIONS INCLUDE REMOVAL OF AN OXIDIZED HYDROCARBON SURFACE LAYER, CHANGES IN SURFACE ENERGETICS, ACTIVATION OF THE FIBER SURFACE, AND ESTABLISHMENT OF

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REACTIVE GROUPS ON THE FIBER SURFACE. THE RESULT IS SIGNIFICANTLY HIGHER INTERFACIAL BOND STRENGTHS, PRIMARILY DERIVED FROM THE CREATION OF COVALENT BONDS BETWEEN THE FIBER AND THE RESIN. THE PHASE I STUDY HAS SIGNIFICANTLY ADVANCED PLASMA TREATMENT TECHNOLOGY FOR KELVAR EPOXY COMPOSITES. THE ADVANTAGES OF BI-GAS PLASMA TREATMENTS HAS BEEN DEMONSTRATED. IMPROVED MECHANICAL PROPERTIES AND THE DEMONSTRATION OF MODIFIED FRACTURE BEHAVIOR HAVE BEEN OBTAINED WITH A HIGH TEMPERATURE EPOXY RESIN SYSTEM. QUANTITATIVE INFORMATION HAS BEEN ACQUIRED ON IMPROVED WETTING AND BONDING CHARACTERISTICS. THE PHASE II STUDY WILL DEFINE PROCESS OPTIMIZATION PARAMETERS, EXTEND THE PROCESS TO A CONTINUOUS PLASMA TREATMENT/FILAMENT WINDING FACILITY, AND CONDUCT APPLICATIONS EVALUATIONS STUDIES UTILIZING AN IMPROVED KELVAR/EPOXY COMPOSITES. MULTIPLY LAMINATES AND STRUCTURES WILL BE FABRICATED AND TESTED TO PROVIDE A MECHANICAL PROPERTIES DESIGN DATA BASE.

PEM RESEARCH CO ARMY
9104 ROBERTA ST
LARGO, FL 33541
DR RICHARD P SPEARS
TITLE:
HIGH DIELECTRIC STRENGTH MATERIALS FOR PULSE STRESS
TOPIC: 06 OFFICE: MICOM

IN AN SBIR PHASE I CONTRACT WITH THE U.S. ARMY MISSILE COMMAND AT REDSTONE ARSENAL, AL., THE PEM RESEARCH CO. OF LARGO, FL., DEVELOPED PROCEDURES TO FABRICATE DIELECTRIC TEST SAMPLES WITH THERMOSETTING PLASTICS AS THE DIELECTRIC AS WELL AS ASSISTED THE PROJECT MANAGER IN ANALYSIS OF DIELECTRIC BREAKDOWN SAMPLES. IN THE PHASE II PROPOSAL PEM RESEARCH CO. PROPOSES TO SUPPLY THE PROGRAM MANAGER WITH DIELECTRIC SAMPLES HAVING ARTIFICIAL VOIDS AS WELL AS SAMPLES WHICH ARE FILLED WITH COMPOUNDS WHICH IN THE CERAMIC FORM ARE GOOD MICROWAVE DIELECTRICS. THE SCOPE OF TESTING PROPOSED BY PEM WILL CONSIST OF BOTH STATIC PULSE AND FAST RISE PULSE TESTING OF POLYMERS. PEM PROPOSES TO MAKE A FAST RISE PROTOTYPE GENERATOR TO PERFORM THESE TESTS. ANOTHER PHASE OF THE EXAMINATION WILL CONSIST OF AN EVALUATION OF THE MOST FEASIBLE METHODS OF ELECTRODING SAMPLES FOR ELECTRICAL TESTING. METALLIZING BY VACUUM PLATING AND ION IMPREGNATION AS WELL AS SILVER PAINTS WILL BE EXAMINED. TO DETERMINE THE MECHANICAL INTEGRITY OF THESE DIELECTRICS MECHANICAL PROPERTIES WILL BE EXAMINED. THE DIELECTRICS WILL BE USED IN STRUCTURAL APPLICATIONS THUS, IT IS RECOMMENDED THAT RESIN-FIBER COMPOSITES ALSO BE EXAMINED.

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PERCEPTRONICS INC AF
6615 MASONS MILL BUSINESS PK
HUNTINGDON VALLEY, PA 19006
O J SNOW
TITLE:
LEMMING: AN ACTIVE RF COUNTERMEASURE
TOPIC: 1[illegible] OFFICE: ASD/XR

*THIS PROPOSED EFFORT IS CONCERNED WITH AN ACTIVE R. F. COUNTER-MEASURE OF THE DECEPTION TYPE FOR MISSILE SYSTEMS EMPLOYING PHASE MONOPULSE SEEKERS. IT IS ESSENTIALLY A GUIDANCE LOOP DESTABILIZER WHERE THE GUIDANCE LOOP, BY DEFINITION, INCLUDES GEOMETRY AND KINEMATICS. FURTHER DISCUSSION ON THIS TOPIC CANNOT BE INCLUDED IN THIS ABSTRACT BECAUSE OF CLASSIFICATION.

PERSON-SYSTEM INTEGRATION LTD NAVY
3012 DUKE ST
ALEXANDRIA, VA 22314
JAMES McGUNNESS
TITLE:
HUMAN FACTORS EXPERT SYSTEM DESIGN AID FOR MILITARY APPLICATIONS OF ROBOTICS
TOPIC: 84 OFFICE: NSWC

*HUMAN FACTORS NEEDS TO BE EMBODIED AS AN "EXPERT SYSTEM" TO BE EFFECTIVELY INTEGRATED WITHIN ROBOTICS APPLICATIONS. THIS PROPOSED EFFORT WILL DESIGN AND DEVELOP AN "EXPERT SYSTEM" TO GUIDE THE APPLICATION OF HUMAN FACTORS IN ROBOTICS. THE EXPERT SYSTEM WILL CONTAIN TWO ELEMENTS: FIRST, A KNOWLEDGE BASE. SECOND, AN "INFERENCE DRIVE." THE KNOWLEDGE BASE WILL BE CONSTRUCTED BY INCORPORATING THE KNOWLEDGE OF EXPERTS AND BY AUTOMATING SELECTED SECTIONS OF CURRENT HUMAN FACTORS GUIDEBOOKS/HANDBOOKS AND OTHER DESIGN AIDS. THE SELECTION WOULD BE GUIDED BY INPUTS FROM HUMAN FACTORS PROFESSIONALS AS WELL AS FROM PROFESSIONALS INVOLVED IN APPLICATIONS OF ROBOTICS. THE INFERENCE DRIVE WILL USE RULES OF REASONING (I.E., HEURISTICS) TO ACCESS, AS WELL AS INTERPRET INFORMATION IN THE KNOWLEDGE BASE AND GENERATE CONCLUSIONS. INFORMATION FROM PAST DESIGN EFFORTS AND STATE-OF-THE-ART DATA SOURCES CONTAIN THOUSANDS OF HUMAN FACTORS PRINCIPLES; THE USE OF WHICH COULD ASSIST IN THE DESIGN OF ROBOTIC SYSTEMS. THE PROPOSED PROJECT WILL IDENTIFY AND EVALUATE PRESENTLY AVAILABLE, VALIDATED HUMAN FACTORS DATA SOURCES. AUTOMATE THESE SOURCES WOULD

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BE PARTICULARLY APPLICABLE TO ENHANCING SAFETY, OPERATION MAINTENANCE AND OTHER CONSIDERATIONS WITHIN BOTH GOVERNMENT AND COMMERCIAL SECTORS.

PHYSICAL SCIENCES INC AF
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
G E CALEDONIA
TITLE:
PASSIVE ELECTRON WAKE QUENCH STUDY
TOPIC: 78 OFFICE: AFBMO/PMX

REENTRY WAKE RADAR SIGNATURES OFFER A POTENTIALLY POWERFUL MEANS OF DISCRIMINATING BETWEEN REENTRY VEHICLES AND PENETRATION AIDS. WE PROPOSE TO DENY OR OBVIATE THE RADAR THREAT THROUGH THE SUCCESSFUL DEMONSTRATION OF A NOVEL PASSIVE ELECTRON WAKE QUENCH CONCEPT. THE IDEA IS TO INTRODUCE FILLER MATERIALS INTO THE RV HEAT SHIELD WHICH WILL VAPORIZE IN THE RV BOUNDARY LAYER BUT RECONDENSE IN THE COOLER NEAR WAKE. THE FINE CONDENSATES IN THE NEAR WAKE CAN EFFICIENTLY REMOVE ELECTRONS BY ATTACHMENT AND HETEROGENEOUS ELECTION/ION RECOMBINATION, RAPIDLY DECREASING THE WAKE RCS. WE PROPOSE TO EMPLOY A REENTRY WAKE PARTICLE CHARGING MODEL DEVELOPED IN THE PHASE I EFFORT TO SCREEN POTENTIAL CANDIDATE MATERIALS FOR HEAT SHIELD FILLERS. THE OPTIMAL MATERIALS WILL THEN BE TESTED IN A SERIES OF BALLISTIC RANGE SHOTS OF SCALED-DOWN SLENDER BODIES. BOTH WAKE RADAR AND RADIATION SIGNATURES WOULD BE MEASURED AND USED TO VALIDATE THE MODEL. PREDICTIONS AND A RECOMMENDED PROGRAM FOR FULL-SCALE FLIGHT TESTS WOULD THEN BE PROVIDED.

PHYSICAL SCIENCES INC AF
603 KING ST
ALEXANDRIA, VA 22314
THOMAS R TUCKER
TITLE:
THREE-COLOR OPTICAL PYROMETRY TEMPERATURE MEASUREMENT
TOPIC: 92 OFFICE: AFBMO/PMX

ADVANCED REENTRY VEHICLE NOSETIP TESTING REQUIRES IN-FLIGHT TRANSIENT PYROMETRY BEYOND THE CAPABILITIES OF THE PHOTOPYROMETERS CURRENTLY BEING USED IN LINEAR RANGE TESTS OF MODEL VEHICLES. THERMAL IMAGING OF NON-CARBONACEOUS NOSETIP TEST MATERIALS MUST BE INSENSITIVE TO CHANGES IN SURFACE EMISSIVITY AND MUST EXTEND TO TEMPERATURES BELOW

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1500 K. PSI HAS SHOWN THAT MULTIPLE SINGLE-COLOR PYROMETERS HAVE THE CAPABILITIES NECESSARY FOR THESE NOSETIP MEASUREMENTS. IN THE PROPOSED PHASE II EFFORT, TWO PROTOTYPE PYROMETER DEVICES WILL BE DEVELOPED ACCORDING TO THE APPROACH AND TECHNICAL RESULTS OF THE PHASE I PROGRAM JUST COMPLETED. THESE TWO DEVICES WILL BE DESIGNED TO MEASURE THE LOWEST TEMPERATURES OF INTEREST TO BMO. A VERY-LOW-TEMPERATURE ONE-COLOR PYROMETER WILL BE ABLE TO MEASURE MATERIALS WITH EMISSIVITIES AS LOW AS 0.2 AT 800 K WITH AN IMAGE RESOLUTION BETTER THAN 2 MM PER PICTURE ELEMENT. THE SECOND DEVICE WILL OPERATE IN A TEMPERATURE RANGE OF 1100 K TO 1800 K AT TWICE THE IMAGE RESOLUTION OF THE FIRST INSTRUMENT. AFTER CONSTRUCTION AND TESTING IN THE OPTICS LABORATORY, IT IS PROPOSED THAT THE SYSTEM BE OPERATED ON A SCHEDULED NOSETIP TEST SERIES AT THE AIR FORCE MODEL VEHICLE TEST FACILITY.

PHYSICAL SCIENCES INC AF
PO BOX 3100 - DASCOMB RESEARCH PARK
ANDOVER, MA 01810
PETER E NEBOLSIN
TITLE:
LASER DAMAGE TO RV ANTENNA COMPONENTS
TOPIC: 100 OFFICE: AFBMO/PMX

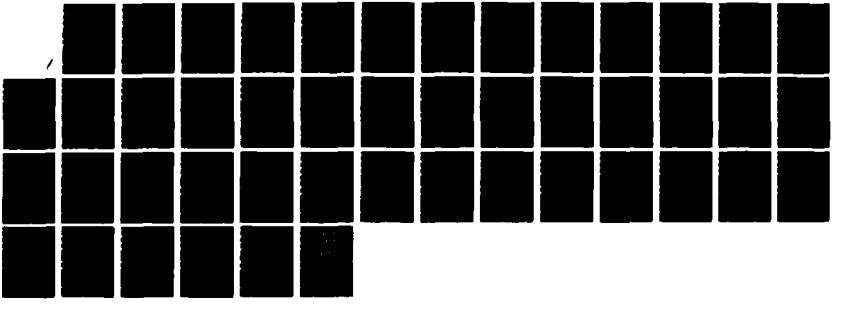
A PROGRAM IS PROPOSED TO OBTAIN A RELEVANT DATA BASE, MODELING CAPABILITY AND SYSTEMS IMPLICATIONS. THE TECHNICAL OBJECTIVES OF THE PROGRAM WILL BE TO: 1. DEFINE RELEVANT EFFECTS AND MAKE PRETEST PREDICTIONS TO ANTENNA WINDOW MATERIALS AND SUBSYSTEM COMPONENTS THAT ARE OF MAJOR CONCERN TO THE ANTENNA DESIGN ENGINEER. 2. DESIGN AND PERFORM EXPERIMENTS TO DEMONSTRATE THE ISSUES AND QUANTITATIVELY MEASURE PERTINENT PARAMETERS SUCH AS INDEPTH TEMPERATURE, SURFACE CONTOUR CHANGE, DEDENSIFICATION LENGTH SCALE, ANTENNA MASS LOSS DEFORMATION. EXPERIMENTS WILL BE PERFORMED WITH DF (WAVELENGTH = 3.8 MICROMETERS), Nd YAG (WAVELENGTH = 1.06 MICROMETERS), AND XeF (WAVELENGTH = 0.35 MICROMETERS) LASERS. 3. ANALYZE EXPERIMENTAL DATA AND COMPARE WITH PRETEST PREDICTIONS. 4. PERFORM A LIMITED SYSTEMS ANALYSIS USING INFORMATION OBTAINED THROUGH EXPERIMENTS AND MODELING TO ASSESS IMPLICATIONS TO THE PERFORMANCE OF THE RV.

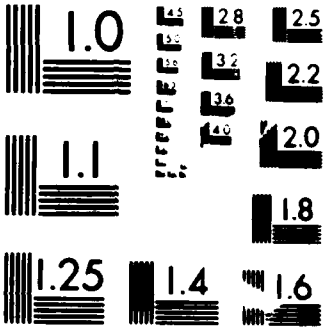
PHYSICAL SCIENCES INC AF
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
W T RAWLINS
TITLE:
PARTICLES INFRARED (IR) OPTICAL PROPERTY MEASUREMENTS
DEFINITION AND DESIGN
TOPIC: 163 OFFICE: AFRPL/TSTS

THE FUNDAMENTAL OPTICAL PROPERTIES

AD-A187 442 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE II AWARDS 1985(U) DEPARTMENT OF DEFENSE WASHINTTON DC 1985 2/2

UNCLASSIFIED F/G 5/1 NL





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PURE-FORM PARTICULATE SPECIES AT HIGH TEMPERATURES ARE CRITICAL INGREDIENTS IN THE NUMERICAL PREDICTION OF RADIATIVE SIGNATURES OF ROCKET EXHAUST PLUMES. PSI PROPOSES TO EXPERIMENTALLY MEASURE THE DESIRED OPTICAL PROPERTIES OVER A WIDE RANGE OF WAVELENGTH, TEMPERATURE, AND PARTICLE SIZE TO ACHIEVE OPTIMAL RESULTS FOR USE IN PREDICTIVE CODES. THE EXPERIMENTS WILL BE CONDUCTED IN A SHOCK TUBE USING SEVERAL SIMULTANEOUS DIAGNOSTICS FOR LIGHT EXTINCTION, EMISSION, AND SCATTERING. THE DATA WILL BE ANALYZED THROUGH AN ANALYTICAL PROTOCOL BASED ON MIE SCATTERING COMPUTATIONS.

PHYSICAL SCIENCES INC NAVY
PO BOX 3100 - DASCOMB RESEARCH PARK
ANDOVER, MA 01810
PETER NEBOLSINE
TITLE:
ARCTIC ICE EXCITATION TECHNOLOGY
TOPIC: 38 OFFICE: NAVSEA

*THIS COMBINED THEORETICAL AND EXPERIMENTAL PROGRAM WILL INVESTIGATE GENERATION OF ACOUSTIC SIGNALS WITH A CO2 LASER. ACOUSTIC SIGNAL GENERATION HAS BEEN DEMONSTRATED AND THIS PROGRAM WILL PROVIDE THE RELATIONSHIP BETWEEN LASER PARAMETERS AND ACOUSTIC PARAMETERS FOR THE EXPERIMENTALLY USED SEA ICE THICKNESS OF APPROXIMATELY 30 CENTIMETERS. THE EXPERIMENTS WILL BE PERFORMED IN THE ONLY COMMERCIALLY AVAILABLE COLD ROOM IN NORTH AMERICA.

PHYSICAL SCIENCES INC AF
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
G E CALEDONIA
TITLE:
SPACE SHUTTLE PLASMA/FLOWFIELD INTERACTIONS
TOPIC: 154 OFFICE: AFGL/XOP

OBSERVATIONS OF THE PLASMA FIELDS AROUND SPACE SHUTTLE ARE INDICATIVE OF PHENOMENA ASSOCIATED WITH NON-LINEAR INTERACTIONS (PLASMA INSTABILITIES). THE CRITICAL IONIZATION VELOCITY (CIV) PROCESS HAS BEEN PROPOSED AS A POSSIBLE DRIVER FOR BOTH PLASMA OBSERVATIONS AND FOR THE SHUTTLE GLOW. WE PROPOSE TO DEFINE A DEFINITIVE SHUTTLE EXPERIMENT TO INVESTIGATE THE TRUE ROLE OF CIV IN THESE OBSERVATIONS. THIS EXPERIMENT INVOLVES INJECTION OF GAS STREAMS INTO THE SHUTTLE FLOWFIELD. SUCH INJECTION PROCESSES ARE

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THEMSELVES IMPORTANT IN ORBIT AS WELL AS AT LOWER ALTITUDES IN PRODUCING PLASMA CLOUDS AND ENHANCED RADIATIVE SIGNATURES INDICATIVE OF SHUTTLE ACTIVITY. SUCH PHENOMENA ARE PARTICULARLY DIFFICULT TO MODEL IN THAT THEY OCCUR IN THE TRANSITION FLOW REGIME OF FLUID DYNAMICS WHICH BRIDGES THE REASONABLY WELL UNDERSTOOD REGIONS OF CONTINUOUS AND FREE MOLECULAR FLOW. WE PROPOSE TO DEVELOP A NON-EQUILIBRIUM CHEMICAL KINETIC MODEL APPROPRIATE FOR THIS TRANSITION REGIME.

PHYSICAL SCIENCES INC SDIO
PO BOX 3100
ANDOVER, MA 01810
ALAN GELB
TITLE:
INTERCEPTOR BLINDING FROM ATMOSPHERE INDUCED EMISSIONS
TOPIC: 18 OFFICE: IST

NO ABSTRACT FOR PHYSICAL SCIENCES INC

PINSON ASSOCS INC ARMY
PO BOX 9648
AUSTIN, TX 78766
A WAYNE SEFCIK
TITLE:
DOPPLER CHAFF
TOPIC: 46 OFFICE: LABCOM/VAL

INCREASING EMPHASIS IS BEING PLACED ON ELECTRONIC COUNTERMEASURES TO REDUCE BATTLEFIELD LOSSES. CHAFF IS AN EFFECTIVE ECM AGAINST NON-COHERENT THREAT RADARS, BUT THE EFFECTIVENESS OF CHAFF IS CONSIDERABLY LESS WHEN USED AGAINST A DOPPLER OR MTI RADAR. SELF-PROTECTION CHAFF DECELERATES VERY RAPIDLY TO LOW DOPPLER FREQUENCIES MAY BE REJECTED BY THE RADAR TRACKING CIRCUITS. HIGH DOPPLER FREQUENCIES MAY BE RESTORED TO CHAFF BY USING NONLINEAR DIPOLES AND ILLUMINATING THEM WITH A MODULATING MICROWAVE SOURCE. THE NONLINEAR DIPOLES ACT AS REMOTE MIXERS AND RERADIATE SYNTHETIC DOPPLER SIGNALS BACK TO THE THREAT RADAR. THIS PROGRAM WILL DEVELOP THE ELECTRICAL AND PHYSICAL SPECIFICATIONS FOR THESE DIPOLES. RESEARCH WILL BE CONDUCTED IN MATERIALS AND PROCESSES TO PRODUCE NONLINEAR DIPOLES MEETING THESE SPECIFICATIONS. SAMPLE DIPOLES WILL THEN BE MANUFACTURED AND TESTED TO DETERMINE THEIR EFFICIENCY IN PRODUCING ADEQUATE CHAFF DOPPLER RESPONSE IN A THREAT RADAR. ONE OR MORE ECM SYSTEM TECHNIQUES WILL BE

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DEVELOPED TO TAKE ADVANTAGE OF EXISTING US ARMY CHAFF DISPENSERS, JAMMING EQUIPMENT AND DOPPLER CHAFF.

PK CORP SDIO
24 SUMMIT RD
STORRS, CT 06268
DR P PAPANTONI-KAZAKOS
TITLE:
RANDOM-ACCESS TRANSMISSION ALGORITHMS FOR DATA LOCAL AR NETWORKS
TOPIC: 4 OFFICE: IST

NO ABSTRACT FOR PK CORP

PLANNING SYSTEMS INC NAVY
7900 WESTPARK DR - STE 600
McLEAN, VA 22102
PETER S TONG
TITLE:
HIGH FREQUENCY SHIFT/PHASE SHIFT PERFORMANCE INVESTIGAT
TOPIC: 25 OFFICE: SPAWAR

*HIGH FREQUENCY (HF) COMMUNICATION IS VERY SENSITIVE TO THE TIME-VARYING NATURE OF THE CHANNEL AND CONSEQUENTLY DATA CANNOT BE TRANSMITTED ACROSS THE CHANNEL ERROR FREE. THE CHANNEL IS INHERENTLY LIMITED IN PERFORMANCE SINCE THE CHANNEL USES THE IONOSPHERE TO REFLECT THE TRANSMITTED SIGNAL. THE QUALITY OF THE CHANNEL IS HIGHLY DEPENDENT ON THE WEATHER CONDITIONS, TIME OF DAY, AND OTHER CHANNEL VARIABLES. IN ORDER TO ESTABLISH RELIABLE COMMUNICATIONS, IT IS NECESSARY TO INCREASE THE SIGNAL-TO-NOISE (SNR) RATION AND/OR USE REDUNDANCY TECHNIQUES SUCH AS CODING. UNDER THIS EFFORT, PSI WILL INVESTIGATE POTENTIAL IMPROVEMENTS TO THE NTDS LINK 11 HF COMMUNICATION SYSTEM BY USING TRANSMISSION SIGNAL CODING. THE RELATIVE EFFICIENCY OF ERROR CONTROL CODING SCHEMES WILL BE COMPARED USING BIT ERROR RATE (BER) AS A PERFORMANCE MEASURE. THE SPECIFIC OBJECTIVE WILL BE TO ESTABLISH POSSIBLE IMPROVEMENTS IN LINK 11 PERFORMANCE WITHOUT ALTERING THE SYSTEM.

PLANNING SYSTEMS INC NAVY
7900 WESTPARK DR - STE 600
McLEAN, VA 22102
DAVID JAARSMA
TITLE:
BROADBAND TRACKING ALGORITHM DEVELOPMENT
TOPIC: 108 OFFICE: NSWC

*PARAMETRIC APPROACHES TO TARGET TRACKING ARE STRAIGHTFORWARD AND

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USUALLY IMPLEMENTED VIA SOME VARIATION OF THE KALMAN FILTER. HOWEVER, A PARAMETRIC APPROACH USES SOME FORM OF A GRADIENT SEARCH ALGORITHM WHICH CAN BECOME LOCKED ONTO EXTRANEOUS OR AMBIGUOUS SOLUTIONS. THIS OCCURS BECAUSE THE OBJECTIVE FUNCTION IS MULTIMODAL. NOT ONLY CAN A PARAMETRIC APPROACH YIELD ERRONEOUS SOLUTIONS, BUT IT CANNOT DISCERN THAT IT HAS LOCKED ONTO A LOCAL RATHER THAN A GLOBAL SOLUTION. AN ALTERNATIVE TARGET TRACKING APPROACH IS PROPOSED FOR THIS EFFORT. THE SOLUTION PROPOSED IS BASED ON A NON-PARAMETRIC TECHNIQUE WHICH DOES NOT INVOKE A PARTICULAR STRUCTURE ON TARGET MOTION DYNAMICS. THIS APPROACH DISCRETIZES TARGET LOCATION ON A TWO-DIMENSIONAL GRID IN (x.y), WHICH IS PROBABILISTICALLY UPDATED VIA BAYESIAN METHODS. THIS APPROACH EXAMINES THE LIKELIHOOD OF ALL POSSIBLE SOLUTIONS IN THE (x<y) GRID, AND HENCE, IS ALWAYS SEEKING A GLOBAL SOLUTION. THE TARGET POSITION IS ESTIMATED EITHER AS AN MSE SOLUTION OR MAP SOLUTION.

POLAR MATERIALS INC AF
BEN FRANKLIN TECH CTR-HOMER RSCH/BLDG F
BETHLEHEM, PA 18016
DR H RONALD THOMAS
TITLE:
PROTECTIVE COATINGS FOR POLYCARBONATE AND ACRYLIC SHEET
TOPIC: 56 OFFICE: AFWAL/ML

A TECHNOLOGY HAS BEEN DEVELOPED FOR OVERCOATING POLYCARBONATE AND POLYACRYLIC SHEET USED IN GLAZING APPLICATIONS THAT IS INTENDED TO RESOLVE THE PROBLEMS ASSOCIATED WITH CRAZING, ABRASION RESISTANCE, UV PROTECTION AND RAIN EROSION RESISTANCE. LABORATORY RESULTS ON SAMPLE SHEETS OF POLYCARBONATE COATED WITH A COMBINATION OF PLASMA CHEMISTRY AND INTERPENETRATING NETWORK (IPN) TECHNOLOGIES HAS DEMONSTRATED THE FEASIBILITY OF THE NEW SYSTEM REFERRED TO AS DIFFUSE INTERFACE BONDING. THE KEY ELEMENTS OF THE SYSTEM ARE THE PLASMA PREPARATION STEPS FOR THE IPN OVERCOATING AND THE INTERFACIAL IPN COATING WHICH ALLOWS FOR DISTRIBUTION OF THE COATING INTERFACIAL STRESSES TO PROVIDE FOR EXCELLENT ADHESION. EXTENSIONS OF THE PLASMA COATING TECHNOLOGY INCLUDE FLEXIBLE METAL OXIDE CONDUCTIVE COATING AND PHOTOCHROMIC LAYERS, BOTH OF WHICH WILL BE DEMONSTRATED IN THIS PHASE II PROGRAM.

POLLARD ROAD INC AF
2361 JEFFERSON DAVIS HWY - STE 708
ARLINGTON, VA 22202
HARRY LEE
TITLE:
ADVANCED NULLING TECHNIQUES
TOPIC: 135 OFFICE: AFSTC/OLAB

SBIR PHASE I WORK PERFORMED BY THE COMPANY HAS DEVELOPED INNOVATIVE

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OPEN-LOOP NULLING ALGORITHMS WITH THE ABILITY. 1. TO RAPIDLY SUPPRESS JAMMERS IN HIGHLY DYNAMIC INTERFERENCE ENVIRONMENTS, AND 2. TO DO SO IN A ROBUST MANNER BY MEANS OF HIGHER-ORDER NULLS. IT IS PROPOSED TO PERFORM PHASE II WORK TO DEMONSTRATE THE EFFECTIVENESS OF THE NEW ALGORITHMS FOR A BROAD RANGE OF OPERATING CONDITIONS, AND ALSO TO DEMONSTRATE BY APPROPRIATE HIGH-LEVEL DESIGNS THAT THE ALGORITHMS ARE SUITABLE FOR HARDWARE IMPLEMENTATION IN NULLING SYSTEMS FOR NEW-GENERATION MILITARY COMSATS.

POTOMAC SOFTWARE SYS NAVY
2600 VIRGINIA AVE NW - STE 1000
WASHINGTON, DC 20037
WILLIAM H IMMERMAN
TITLE:
APPLICATION OF NONPROCEDURAL LANGUAGE TO EMBEDDED WEAPO SYSTEMS SOFTWARE DEVELOPMENT
TOPIC: 69 OFFICE: NSWC/DL

*A NONPROCEDURAL, VERY HIGH-LEVEL COMPUTER LANGUAGE CALLLED RSP HAS BEEN DEFINED FOR SPECIFYING AND IMPLEMENTING PROCESS-CONTROL SOFTWARE. THE PROPOSED WORK WOULD EXAMINE THE APPLICABILITY OF RSP TO EMBEDDED WEAPONS SYSTEM SOFTWARE DEVELOPMENT AND WOULD IDENTIFY MODIFICATIONS OF RSP NEEDED FOR THE APPLICATION. REQUIREMENTS WOULD BE ANALYZED FOR AN IMPLEMENTATION OF AN RSP-BASED DEVELOPMENT SYSTEM FOR EMBEDDED WEAPONS SYSTEM SOFTWARE. DURING THE COURSE OF THE STUDY, TYPICAL NAVY APPLICATIONS WOULD BE CHARACTERIZED AND EXAMPLES SELECTED, SPECIFIED, AND PROGRAMMED IN RSP.

PRACTICAL SCIENCES INC NAVY
40 LONG RIDGE RD
CARLISLE, MA 01741
DR HAROLD STALFORD
TITLE:
GUN SIMULATION MODEL WHICH OPTIMALLY ENGAGES MANEUVERIN TRAJECTORIES - ADVANCED DEVELOPMENT
TOPIC: 138 OFFICE: JCM/NSWC-DL

*THE LATEST TRACK, FILTERING AND PREDICTION TECHNOLOGY DEVELOPED FOR ENGAGING MANEUVERING CRUISE MISSILES WILL BE IMPLEMENTED IN COMPUTER CODE FORM FOR USE IN SURVIVABILITY STUDIES OF CRUISE MISSILES VERSUS GUN SYSTEMS. ADVANCED MULTI-LEVEL FILTERING TECHNOLOGY WILL BE USED WHICH OPTIMALLY TRACKS, FILTERS AND PREDICTS ALL TRAJECTORY TYPES,

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FROM THE SIMPLEST OF CONSTANT SPEED AND HEADING TO THE MOST COMPLEX FORM OF EVASIVE MANEUVERS. THE RESULTING COMPUTED CODE WILL BE USED TO MODIFY CURRENT GUN SYSTEM SIMULATION PROGRAMS. THE MODIFY PROGRAMS WILL BE USED TO CONDUCT SURVIVABILITY STUDIES FOR CRUISE MISSILE TRAJECTORIES OF CURRENT INTEREST TO THE NAVY.

PRECISION ACOUSTIC DEVICES INC ARMY
200 HAMMOND AVE
FREMONT, CA 94539
DR B T KHURI-YAKUB
TITLE:
50 MHz LIQUID COUPLED ULTRASONIC SHEAR WAVE IMAGING SYS FOR NONDESTRUCTIVE EVALUATION OF CERAMICS
TOPIC: 80 OFFICE: MTL/LABCOM

THE OUTSTANDING PHYSICAL PROPERTIES OF CERAMICS MAKE THEM IMPORTANT STRUCTURAL MATERIALS. THEIR SUSCEPTIBILITY TO FAILURES DUE TO VERY SMALL DEFECTS HAS LED TO A NEED FOR A VERY HIGH RESOLUTION FLAW DETECTION SYSTEM. EXISTING TECHNIQUES CANNOT DETECT ALL DANGEROUS DEFECTS. WE HAVE DEMONSTRATED IN PHASE I AN ACOUSTIC TECHNIQUE FOR IMAGING FLAWS IN CERAMICS, USING 50 MHz SHEAR WAVES, COUPLED AT A 45 DEGREE ANGLE INTO THE SAMPLE THROUGH A THIN LIQUID LAYER. THE TECHNIQUE ELIMINATES THE NEAR-SURFACE DEAD ZONE COMMON TO MOST ACOUSTIC TECHNIQUES, AND HAS TWICE THE RESOLUTION OF LONGITUDINAL WAVES AT THE SAME FREQUENCY. IT IS ESTIMATED THAT THE TECHNIQUE IS CAPABLE OF DETECTING FLAWS OF THE ORDER OF 25 MICRONS, WITH AN IMAGE RESOLUTION OF .4 mm. IT CAN SCAN AT A RATE OF AT LEAST 1 SQUARE INCH PER MINUTE. WE PROPOSE HERE TO BUILD A PROTOTYPE OF A COMMERCIAL SYSTEM USING THIS TECHNIQUE, AND TO DEMONSTRATE ITS CAPABILITIES ON SAMPLES OF INTEREST TO INDUSTRIAL AND GOVERNMENTAL USERS OF CERAMICS, THROUGH JOINT TESTING PROGRAMS.

Q-DOT INC AF
1069 ELKTON DR
COLORADO SPRINGS, CO 80907
DR PETER C T ROBERTS
TITLE:
LOW-POWER A/D CONVERTER FOR SPACE SYSTEMS APPLICATION
TOPIC: 141 OFFICE: AFSTC/XNR

AFSTC SEEKS ANALOG-TO-DIGITAL (A/D) CONVERTERS WHICH CAN OPERATE ON COOLED FOCAL-PLANE IMAGERS AT SPEED COMPARABLE TO THEIR NORMAL READ-

SUBMITTED BY DEPT

OUT SPEED FOR FUTURE SPACE SYSTEMS APPLICATIONS. AS IR DETECTOR TECHNOLOGY ADVANCES, LARGER ARRAYS OF MORE PRECISE DETECTORS WILL BE BUILT. ACCORDINGLY, THEIR READOUTS WILL NEED TO BE FASTER AND MORE PRECISE. IT IS DIFFICULT TO ENVISION TRANSMITTING FASTER, MORE PRECISE ANALOG SIGNALS THROUGH A CRYOSTAT. CONVERTING THE SIGNAL FROM ANALOG TO DIGITAL (A/D) FORM PRIOR TO TRANSMISSION OFFERS AN ATTRACTIVE ALTERNATIVE. NO KNOWN A/D CONVERTERS ARE SUITABLE TO THIS TASK. Q-DOT, INC., PROPOSES A NOVEL 12-BIT, 150Ks/s 10 mK A/D CONVERTER CHIP WHICH CAN OPERATE AT CRYOGENIC TEMPERATURES (10 DEG K - 40 DEG K) AND IS SMALL ENOUGH (25 X 25 MIL[2]) TO BE LOCATED ON THE FOCAL-PLANE ARRAY. HIGHER SAMPLING RATES (UP TO 4 Ms/s) AND RADIATION TOLERANCE MAY ALSO BE FEASIBLE. THE CHIP IS BASED ON GEOMETRICAL RATIOS OF SURFACE-CHANNEL CHARGE-COUPLED DEVICE (SCCD) STRUCTURES AND IS, CONSEQUENTLY, STABLE AND LINEAR.

QUANTEX CORP AF
2 RESEARCH CT - STE 100
ROCKVILLE, MD 20850
DR JOSEPH LINDMAYER
TITLE:
ELECTROLUMINESCENT (EL) LAMPS TO ACHIEVE HIGHER BRIGHTN
LONGER LIFE AND MORE UNIFORM LIGHT OVER TIME
TOPIC: 3 OFFICE: ASD/AE

THE FEASIBILITY OF IMPROVING ELECTROLUMINESCENT (EL) LAMPS BY STABILIZING THE TRANSPARENT CONDUCTOR AND DIELECTRICS WAS DEMONSTRATED IN PHASE I. PHASE II WILL BE DIRECTED TOWARD IMPROVING, IF POSSIBLE, THE ZnS PHOSPHOR (THE REMAINING WEAKEST PART OF THE LAMP). NEW PHOSPHORS WILL BE INTRODUCED WITH THE ANTICIPATION OF FINDING A FAR MORE STABLE PHOSPHOR. IN ADDITION, THE STRUCTURES AND FABRICATIONS PROCESSES WILL BE OPTIMIZED; YIELDING A MANUFACTURABLE TECHNOLOGY. IT IS ANTICIPATED THAT THE PHASE II LAMPS WILL BE CAPABLE OF SHOWING A 100% IMPROVEMENT IN BRIGHTNESS WHEN COMPARED TO THE PHASE I RESULTS AND IN GENERAL A FACTOR OF THREE IMPROVEMENT IN LIFETIME IS EXPECTED. PRODUCTION COSTS OF THE SELECTED TECHNOLOGY WILL BE ESTIMATED.

QUANTIC INDUSTRIES INC AF
990 COMMERCIAL ST
SAN CARLOS, CA 94070
DALE SCHRUMPF
TITLE:
UNIQUE SIGNAL DEVICE HARDWARE DEVELOPMENT
TOPIC: 118 OFFICE: BMO/PMX

UNDER SBIR PHASE I CONTRACT F04704-85-C-0156 QUANTIC INDUSTRIES

SUBMITTED BY DEPT

DEVELOPED AND PREPARED FOR HEADQUARTERS BALLISTIC MISSILE OFFICE A UNIQUE SIGNAL SAFETY DEVICE (USSD) ENGINEERING DESIGN HANDBOOK (DOCUMENT BMO-86-7). A PHASE II PROGRAM IS DESCRIBED TO DESIGN, DEVELOP, AND TEST ENGINEERING PROTOTYPE HARDWARE TO PROVIDE A FLEXIBLE AND MODULAR USD WHICH WILL MEET THE REQUIREMENTS CITED IN THE USSD ENGINEERING DESIGN HANDBOOK. THE TASKS IN THE PHASE II PROGRAM CONSIST OF: 1) TRADE STUDIES, 2) SPECIFICATIONS, 3) DESIGN, 4) TEST, AND 5) DOCUMENTATION. THE FINAL OBJECTIVE OF THE PROGRAM IS A USSD WHICH IS LIGHTWEIGHT, ULTRA-RELIABLE, INEXPENSIVE, AND HAS FEW MOVING PARTS.

RADIATION MONITORING DEVICES INC AF
44 HUNT ST
WATERTOWN, MA 02172
DR GERALD ENTINE
TITLE:
ALL SOLID STATE INTEGRATING DOSIMETER
TOPIC: 208 OFFICE: AMD/RDO

WITH THE CONTINUED IMPROVEMENT IN MODERN AIRCRAFT AND THE INCREASED INTEREST IN HIGH ALTITUDE FLIGHT AND LOW ALTITUDE ORBITAL MISSIONS, THERE HAS EMERGED A SPECIFIC AIR FORCE NEED FOR AN ACCURATE AND DEPENDABLE FLIGHT DOSIMETRY SYSTEM. REAL TIME DOSIMETRY UNDER THESE CONDITIONS IS EXTREMELY IMPORTANT BECAUSE OF THE COMPLEX AND POTENTIALLY HAZARDOUS NATURE OF THE RADIATION FIELD ENCOUNTERED DURING THESE FLIGHTS. FOR SEVERAL YEARS, THE GOVERNMENT HAS SPONSORED DOSIMETRY RESEARCH WHICH HAS RESULTED IN THE DEVELOPMENT OF KEY BUILDING BLOCKS NEEDED TO MAKE A DOSIMETER CAPABLE OF ADDRESSING THE CURRENT REQUIREMENTS. DURING PHASE I, WE INVESTIGATED THE CONCEPT OF INTEGRATING THESE NEW TECHNOLOGIES INTO A BROAD SPECTRUM, ALL SOLID STATE DOSIMETER. THE PHASE I RESULTS SHOW THAT SUCH A DOSIMETRY SYSTEM IS, IN FACT, WITHIN THE REACH OF CURRENT TECHNOLOGY. WE THEREFORE PROPOSE, IN COLLABORATION WITH THE HARVARD UNIVERSITY CYCLOTRON RESEARCH GROUP, A PHASE II PROGRAM TO DEVELOP A NEW AIR FORCE FLIGHT DOSIMETER. BY THE END OF THE PROGRAM, A FULLY FUNCTIONING PROTOTYPE WILL HAVE BEEN BUILT AND TESTED AND BE READY FOR INCORPORATION INTO THE AIR FORCE PERSONNEL DOSIMETRY PROGRAM.

RADIATION MONITORING DEVICES INC ARMY
44 HUNT ST
WATERTOWN, MA 02172
DR GERALD ENTINE
TITLE:
RAPID NONDESTRUCTIVE DETERMINATION OF RESIN/FIBER CONTE
IN COMPOSITES
TOPIC: 78 OFFICE: MTL/LABCOM

THERE IS AN UREGENT NEED FOR A PORTABLE INSTRUMENT THAT CAN BE USED

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TO RAPIDLY AND NONDESTRUCTIVELY ASSAY THE GLASS FRACTION IN COMPOSITE MATERIALS USED IN ARMOR PLATE. DURING PHASE I, WE DEVELOPED A NOVEL RADIOMETRIC APPROACH, AND SUCCESSFULLY DEVELOPED METHODS TO ACCURATELY MEASURE THE GLASS FRACTION OF COMPOSITE MATERIALS. OUR CENTRAL OBJECTIVE FOR PHASE II IS THE CONSTRUCTION OF A FULLY FUNCTIONAL FIELD PROTOTYPE INSTRUMENT.

RD INSTRUMENTS NAVY
10035 CARROLL CANYON RD
SAN DIEGO, CA 92131
FRANCIS ROWE
TITLE:
PULSE-TO-PULSE COHERENT DOPPLER SONAR DEVELOPMENT
TOPIC: 3 OFFICE: ONR

*A RESEARCH AND DEVELOPMENT PROJECT IS PROPOSED TO DEVELOP A PULSE-TO-PULSE COHERENT ACOUSTIC DOPPLER CURRENT PROFILE (ADCP). THIS ADCP WILL PROVIDE APPROXIMATELY A FACTOR OF 100 IMPROVEMENT OVER CONVENTIONAL ADCP'S IN BOTH SHORT-TERM MEAN WATER FLOW VELOCITIES AND DEPTH RESOLUTION. IN ADDITION, SMALL SCALE TURBULENCE LEVELS APPROACHING AMBIENT OCEAN TURBULENCE LEVELS MAY BE DIRECTLY COMPUTED FROM THE DOPPLER ECHO SPECTRUM SECOND MOMENT. THE PRIMARY PHASE I OBJECTIVES ARE TO INVESTIGATE TECHNIQUES OF IMPROVING THE QUALITY AND VELOCITY RANGE OF MEAN FLOW VELOCITY AND SMALL SCALE TURBULENCE MEASUREMENT, AND ACHIEVE A VELOCITY/TURBULENCE PROFILING RANGE TO SEVERAL HUNDRED METERS.

RELIABILITY SCIENCES INC NAVY
2361 S JEFFERSON DAVIS HWY - ML111
ARLINGTON, VA 22202
SPYROS A VRACHNAS
TITLE:
PACKAGE ELECTROSTATIC DISCHARGE (ESD) SUSCEPTABILITY
TOPIC: 123 OFFICE: NWSC

*SINCE THE EARLY 1960'S, IT HAS BEEN RECOGNIZED THAT "ELECTROSTATIC DISCHARGE" (ESD) CAN DAMAGE ELECTRONIC PARTS. WITH THE PROGRESSIVE MICROMINIATURIZATION OF ELECTRONICS, MORE AND MORE PARTS BECOME SUSCEPTIBLE TO DAMAGE FROM ESD. THE TREND TOWARDS GREATER MICROMINIATURIZATION AND MORE COMPLEX DEVICES (E.G., VLSI AND VHSI) WILL RESULT IN ESD BECOMING AN EVEN MORE SIGNIFICANT PROBLEM IN THE FUTURE. TODAY MOST MICROCIRCUITS, LOW POWER DISCRETE SEMICONDUCTORS, AND

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THICK AND THIN FILM DEVICES ARE SUSCEPTIBLE TO DAMAGE FROM ESD. THIS DAMAGE CAN OCCUR DURING MANUFACTURE, ASSEMBLY, TEST, HANDLING, OR USE OF THE COMPONENT OR ASSEMBLY. THE DETERMINATION OF SENSITIVITY BY PACKAGE TYPE COULD RESULT IN USING THE LEAST SENSITIVE PACKAGE TYPE AND REDUCING OVERALL DAMAGE TO ESD SENSITIVE DEVICES. DETERMINATION OF PACKAGE SENSITIVITY REQUIRES CONTROLLED EXPERIMENTS AND DETERMINATION OF RELATIVE AGNITUDE OF ELECTROSTATIC CHARGE, FIELD STRENGTH DEVICE ORIENTATION, MATERIALS AND GROUNDING OF SURFACES ON WHICH DEVICES ARE TESTED.

RIZZO P C ASSOCS INC AF
PO BOX 17180
PITTSBURGH, PA 15235
WILLIAM J JOHNSON
TITLE:
DEVELOPMENT OF IMPROVED SHEAR WAVE SURVEYING
TOPIC: 88 OFFICE: AFBMO/PMX

THE DEEP BASING PROGRAM REQUIRES THAT GEOTECHNICAL INFORMATION BE OBTAINED FROM THOUSANDS OF FEET BELOW THE GROUND SURFACE. THE RECORDING OF SHEAR WAVE REFLECTIONS OFFERS AN EXCELLENT POTENTIAL FOR OBTAINING MUCH OF THE NEEDED INFORMATION. IN PARTICULAR, THE COMBINATION OF SHEAR WAVE WITH CONVENTIONAL SURVEYING HAS THE POTENTIAL FOR BEING A POWERFUL TOOL TO ESTIMATE BULK ROCK ELASTIC PARAMETERS, AS WELL AS STRENGTH, DENSITY, FLUID CHARACTERISTICS, AND LITHOLOGY. THE TECHNOLOGY FOR RECORDING AND ANALYZING SHEAR WAVE REFLECTIONS IS NOT YET MATURE. THE PROPOSED RESEARCH WILL ESTABLISH A STATE-OF-THE-ART BASELINE BY INCORPORATING TRIAXIAL GEOPHONES TO SIMULTANEOUSLY RECORD P. P-SV, AND SH WAVES TO ENHANCE THE RESOLUTION OF THE SHEAR WAVES. THE SURVEY WILL BE CONDUCTED IN AN AREA WHERE CONDITIONS ARE ALREADY KNOWN SO THAT THE EFFECTIVENESS OF THE SURVEY CAN BE DETERMINED. IN ADDITION, THE RESEARCH WILL ALSO INITIATE DEVELOPMENT OF A RING LASER GEOPHONE WHICH HAS THE POTENTIAL FOR IMPROVING THE ABILITY WITH WHICH SHEAR WAVES CAN BE RECORDED. SUCH A PROGRAM WILL SURPASS CURRENT OIL FIELD TECHNOLOGY AND SIGNIFICANTLY ADVANCE THE STATE-OF-THE-ART.

SAILCOMP INDUSTRIES INC NAVY
850 AQUIDNECK AVE
MIDDLETOWN, RI 02840
A H KITS VAN HEYNINGEN
TITLE:
SOLID-STATE DOPPLER WIND SENSOR
TOPIC: 131 OFFICE: NAVAIR/NAEC

*SAILCOM INDUSTRIES PROPOSES TO DESIGN AN ACOUSTIC DOPPLER WIND

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VELOCITY AND DIRECTION SENSING SYSTEM THAT OVERCOMES THE PROBLEM ASSOCIATED WITH PRESENT MECHANICAL DESIGNS. THE ACOUSTIC VELOCIMETER SYSTEM WILL CONSIST OF FOUR PAIRS OF TRANSDUCERS IN FEEDBACK LOOPS. BY MEASURING THE DOPPLER PHASE SHIFT IN EACH OF THE FOUR LEGS OF THE SYSTEM, WIND VELOCITY AND DIRECTION CAN BE CALCULATED. THIS SOLID-STATE SYSTEM IS FREE FROM THE EFFECTS OF FRICTION, MASS AND INERTIA. IT IS NOT AFFECTED BY THE METEOROLOGICAL ENVIRONMENT AND WILL REQUIRE NO MAINTENANCE. THE SYSTEM WILL MEASURE WIND VELOCITIES OF UP TO 100 KNOTS WITH AN ACCURACY OF BETTER THAN PLUS OR MINUS 1 KNOT UP TO 60 KNOTS AND PLUS OR MINUS 2.5 KNOTS OVER 60 KNOTS. DIRECTIONAL ACCURACY WILL BE PLUS OR MINUS 2 DEGREES THROUGHOUT THE ENTIRE WIND VELOCITY RANGE. THE PROPOSED RESEARCH WILL COVER SIX MONTHS AND ADDRESS SUCH ISSUES AS LOOP STABILITY, LOOP GAI, ICING, FLUTTER, BEAM WIDTH, SIDE LOBE RESPONSE AND AERODYNAMIC CONSIDERATIONS FOR SENSOR CONFIGURATION. SAILCOM INDUSTRIES WILL BUILD A WORKING MODEL TO SHOW PROOF OF PRINCIPLE AND DELIVER A FINAL REPORT WHICH DETAILS THE OUTCOME OF THE RESEARCH AND ADDRESSES THE FEASIBILITY OF THE CONCEPT FOR FUTURE DEVELOPMENT.

SCHAFER W J ASSOCS INC SDIO
CORPORATE PLACE 128 - BLDG 2/STE 300
WAKEFIELD, MA 01880
DR RAYMOND B SCHAEFER
TITLE:
TOPIC: 1 OFFICE: IST

NO ABSTRACT FOR SCHAFER W J ASSOCS INC

SCHWARTZ ELECTRO-OPTICS INC SDIO
4806 N ORANGE BLOSSOM TRAIL
ORLANDO, FL 32810
DR PETER F MOULTON
TITLE:
TUNABLE SINGLE-FREQUENCY Nd:YAG LASERS FOR COHERENT LID
TOPIC: 1 OFFICE: IST

NO ABSTRACT FOR SCHWARTZ ELECTRO-OPTICS INC

SCIENTIFIC COMPUTING ASSOCS INC AF
246 CHURCH ST - STE 307
NEW HAVEN, CT 06510
DR MARK W ANGEVINE
TITLE:
MODIFICATION AND IMPROVEMENT OF SOFTWARE FOR MODELING MULTIDIMENSIONAL FUEL FLOWS
TOPIC: 64 OFFICE: AFWAL/PO

THE DIFFUSION FLAME IS THE FLAME TYPE OF MOST PRACTICAL COMBUSTION

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DEVICES. THESE FLAMES ARE IMPORTANT IN THE INTERACTION OF HEAT AND MASS TRANSFER WITH CHEMICAL REACTIONS IN RAM JETS, JET TURBINES, AND COMMERCIAL BURNERS. ALTHOUGH THREE-DIMENSIONAL MODELS THAT COUPLE THE EFFECTS OF FLUID FLOW WITH DETAILED CHEMICAL REACTIONS ARE AS YET COMPUTATIONALLY INFEASIBLE, WE CAN GET IMPORTANT INFORMATION IN PRACTICAL SYSTEMS BY CONSIDERING TWO-DIMENSIONAL CONFIGURATIONS. IN PARTICULAR, IN THIS THIS PROPOSAL WE FOCUS OUR ATTENTION ON AXISYM-METRIC DIFFUSION FLAMES IN WHICH A CYLINDRICAL FUEL STEAM IS SUR-ROUNDED BY A COFLOWING OXIDIZING JET. IN THIS CONFIGURATION WE CAN STUDY THE INTERACTION OF FLUID FLOW WITH CHEMICAL REACTIONS WHILE OBTAINING A COMPUTATIONALLY FEASIBLE PROBLEM. UNLIKE MODELS IN WHICH DIFFUSION IN THE AXIAL DIRECTION IS NEGLECTED, WE WILL DEVELOP A CODE (AXIJET) THAT TREATS THE FULL SET OF NONLINEAR ELLIPTIC BOUNDARY VALUE PROBLEMS FOR BOTH LAMINAR AND TURBULENT FLAMES. THIS PHASE II RESEARCH IS BUILT UPON OUR PHASE I RESEARCH IN WHICH WE DEVELOP NEW COMPUTATIONAL METHODS FOR THE SOLUTION OF ONE-DIMENSIONAL PREMIXED LAMINAR FLAMES. THE RESULTS OF OUR PROPOSED WORK WILL BE APPLICABLE TO PROBLEMS IN 1) TURBULENT REACTING FLOWS, 2) ENGINE EFFICIENCY, 3) COMMERCIAL POWER GENERATION UNITS, AND 4) POLLUTANT FORMATION.

SCIENTIFIC RESEARCH ASSOCS INC AF
PO BOX 498
GLASTONBURY, CT 06033
HAROLD L GRUBIN
TITLE:
NUMERICAL SIMULATION OF HIGH SPEED HETEROSTRUCTURE BIPO DEVICES
TOPIC: 19 OFFICE: AFWAL/AA

THIS DOCUMENT DISCUSSES A PHASE II PROPOSAL TO PERFORM TWO-DIMENSIONAL NUMERICAL SIMULATION OF AlFGaAs/GaAs HETEROSTRUCTURE BI-POLAR TRANSISTORS (HBT). THE HBTs ARE LIKELY TO FIND IMPORTANT APPLICATIONS IN ANALOG-TO-DIGITAL CONVERTERS AND AS HIGH SPEED DE-VICES BOTH IN DIGITAL CIRCUITS AND AS DISCRETE DEVICES. THE PURPOSE OF THIS PROPOSAL IS TO STUDY THE OPERATIONAL PHYSICS OF THE HBT, TO EVALUATE THE SUITABILITY AND THE LIMITATIONS, IF ANY, OF THE HBT FOR THE ABOVE APPLICATIONS, AND TO SUGGEST DESIGN MODIFICATIONS TO MEET THE SPECIFICATIONS CALLED FOR BY THE APPLICATIONS. THE TASKS PRO-POSED TO ACCOMPLISH THESE GOALS INCLUDE INVESTIGATION OF VARIOUS LINEAR AND NON-LINEAR COMPOSITIONAL GRADING OF THE EMITTER, GRADING OF THE BASE, A DETAILED PARAMETIC STUDY INVOLVING EMITTER, BASE AND COLLECTOR DESIGN VARIABLES SUCH AS DOPING AND LAYER WIDTHS AND DOUBLE

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HETEROSTRUCTURES WITH A WIDE-GAP COLLECTOR. THE ABOVE TASKS WILL BE PERFORMED THROUGH SOLUTION TO THE TWO-DIMENSIONAL DRIFT AND DIFFUSION EQUATIONS. IN ADDITION, THE EFFECTS OF NON-EQUILIBRIUM VELOCITY OVERSHOOT WILL BE ASSESSED THROUGH SOLUTIONS TO THE MOMENTS OF THE BOLTZMAN TRANSPORT EQUATIONS.

SCIENTIFIC SYSTEMS INC AF
54 CAMBRIDGE PARK DR
CAMBRIDGE, MA 02140
WALLACE E LARIMORE
TITLE:
ADAPTIVE TIME SERIES ANALYSIS USING PREDICTIVE INFERENC AND ENTROPY
TOPIC: 199 OFFICE: AFOSR/XOT

IN MODELING AND CONTROL FOR MANY AEROSPACE AND COMMERCIAL SYSTEMS, THE PROCESS DYNAMICS AND DISTURBANCES CHANGE WITH TIME BOTH SLOWLY AND ABRUPTLY. THE OBJECT OF THE PROPOSED PHASE II RESEARCH IS TO RESEARCH AND DEVELOP ADAPTIVE TIME SERIES METHODS BASED UPON PRE-DECEPTIVE INFERENCE AND ENTROPY METHODS OF MODEL APPROXIMATION. THIS APPROACH USES NUMERICALLY STABLE ALGEBRAIC COMPUTATIONS BASED UPON A CANONICAL VARIATE ANALYSIS FOR RELIABLE DETERMINATION OF STATISTICAL RANK. THE PROPOSED PHASE II RESEARCH INCLUDES FURTHER STUDY AND DEMONSTRATION OF THE ENTROPY BASED METHODS, ALGORITHM DESIGN AND TESTING, AND SOFTWARE DEVELOPMENT AND IMPLEMENTATION IN PORTABLE LANGUAGES. PHASE III IS EXPECTED TO INVOLVE IMPLEMENTATION AND FLIGHT TESTING IN THE ADVANCED DEVELOPMENT PROGRAM OF THE ADAPTIVE FLUTTER SUPPRESSION SYSTEM.

SCOPE INC AF
1860 MICHAEL FARADAY DR
RESTON, VA 22090
DR JOHN F GREEN
TITLE:
DEVELOPING CONCEPTS FOR CUT-TO-CUT CORRELATION
TOPIC: 176 OFFICE: ESD/XRCT

*SIGNAL PROCESSING CONCEPTS ARE PROPOSED TO BE DEVELOPED HERE TO IMPROVE PASSIVE IDENTIFICATION AND LOCALIZATION OF MULTIPLE SIMILAR EMITTERS. THESE CONCEPTS WILL BE DEVISED TO EXPLOIT AVAILABLE IDENTIFYING INTRINSIC AND EXTRINSIC EMITTER SIGNAL CHARACTERISTICS TO ENABLE ASSOCIATION OR CORRELATION OF COMMON SOURCE MEASUREMENTS FOR

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LOCALIZATION. INTRINSIC SIGNAL DISCRIMINATORS OF POTENTIAL INTEREST INCLUDE PHASE, INTERMODULATION ARTIFACTS, AND OTHER MODULATION NON-LINEARITIES, AS WELL AS THE MORE COMMONLY ENCOUNTERED EMITTER PARAMETERS. THIS INVESTIGATION WILL EXAMINE THE POTENTIAL VALUE OF EXTRINSIC SIGNAL CHARACTERISTICS, SUCH AS PARASITIC MULTIPATHS, TO EFFECT EMITTER IDENTIFICATION IN THE PRESENT APPLICATION. QUALITATIVE AND QUANTITATIVE IDENTIFICATION PERFORMANCE ESTIMATES, IN THE CASE OF SELECTED EMITTERS, WILL BE GENERATED AS FAR AS POSSIBLE, FOR THE MORE PROMISING CONCEPTS. CRITICAL TECHNOLOGY AND INFORMATION FACTORS WILL BE SPECIFIED FOR THESE LATTER CONCEPTS.

SECURITY VENTURES CORP AF
25 BLACK LATCH LANE
CHERRY HILL, NJ 08003
DR DAVID SHEBY
TITLE:
USE OF THE BISPECTRUM FOR SPREAD SPECTRUM EMITTER FINGE
TOPIC: 176 OFFICE: ESD/XRCT

*TECHNIQUES EXIST TO EXTRACT HARMONIC STRUCTURES UNDERLYING SPECIAL SIGNALS THAT ARE UNAVAILABLE FROM THE CONVENTIONAL FFT. THIS PROPOSAL, BASED ON INITIAL RESULTS, IDENTIFIED THOSE TECHNIQUES AND SUGGESTS HOW THEY MAY BE USED FOR SPECIAL TARGET RECOGNITION, AND CERTAIN TYPES OF SPREAD SPECTRUM DETECTION.

SEVEN MOUNTAINS SCIENTIFIC INC NAVY
PO BOX 650
BOALSBURG, PA 16827
DR E THOMAS CHESWORTH
TITLE:
COMPUTER SIMULATION OF ELECTRONIC COUNTERMEASURES (ECM)
TOPIC: 135 OFFICE: NPRDC

*SEVEN MOUNTAINS SCIENTIFIC INC. PROPOSES A SIX*MONTH PHASE I EFFORT TO DEVELOP SIMULATED RADAR DISPLAYS ON HARDWARE COMPATIBLE WITH IBM PERSONAL COMPUTERS. THE DISPLAYS WILL BE REALISTIC REPLICAS OF RADAR DISPLAYS WHEN THE RADAR IS BEING INTERFERED WITH BY VARIOUS ELECTRONIC COUNTERMEASURES (ECM). THE RESULTANT SOFTWARE WILL BE USABLE ON A VARIETY OF INEXPENSIVE, READILY AVAILABLE PERSONAL COMPUTERS. THE PHASE I WORK WILL DEMONSTRATE THE FEASIBILITY OF USING INEXPENSIVE HARDWARE BY DISPLAYING A SMALL NUMBER OF ECM DISPLAYS. THE PHASE II WORK WILL EXPAND THIS FOLIO AND INTRODUCE MULTIPLE ECM TECHNIQUES AND

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TARGET SIMULATIONS.

SIMULA INC ARMY
2223 S 48TH ST
TEMPE, AZ 85282
JAMES C WARRICK
TITLE:
IMPROVED PRESSURE MANAGEMENT DEVICE FOR LANDING GEAR SH
ABSORBING STRUTS DEVELOPMENT
TOPIC: 22 OFFICE: AVSCOM

PHASE II ABSTRACT TO BE FURNISHED BY ARMY PROGRAM MANAGER (MR FORRY)
13 AUG 87. TO BE FUNDED WITH 88 FUNDS.

SIMULA INC ARMY
2223 S 48TH ST
TEMPE, AZ 85282
S P DESJARDINS
TITLE:
CRASHWORTHY CREWSEAT ADVANCEMENT
TOPIC: 23 OFFICE: AVSCOM

PHASE II ABSTRACT TO BE FURNISHED BY ARMY PROGRAM MANAGER (MR FORRY)
13 AUG 87. TO BE FUNDED WITH 88 FUNDS.

SPACE POWER INC SDIO
1977 CONCOURSE DR
SUNNYVALE, CA 95131
JOSEPH R WETCH
TITLE:
COMPACT CLOSED CYCLE BURST POWER SYSTEMS
TOPIC: 2 OFFICE: IST

NO ABSTRACT FOR SPACE POWER INC

SPACE SYSTEMS ENGINEERING INC AF
75 W 100 SOUTH - STE 220
LOGAN, UT 84321
DORAN BAKER
TITLE:
TRANSATMOSPHERIC MISSION SENSOR TECHNOLOGY
TOPIC: 13 OFFICE: ASD/XR

IT IS PROPOSED TO DEVELOP A VEHICLE REFERENCE SENSOR WHICH RESULTED

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FROM THE PHASE I DESIGN STUDY USING INNOVATIVE TECHNOLOGY APPLIED TO AEROSPACE VEHICLES. IT IS FURTHER PROPOSED TO PERFORM RESEARCH ON AN UPPER ATMOSPHERIC DENSITY SENSOR NEEDED FOR MANEUVERING VERY HIGH SPEED MANNED AEROSPACE CRAFT. AS PART OF THIS EFFORT SENSOR DESIGNER TOOLS WILL BE DEVELOPED FOR CRITICAL COMPONENT SELECTION INCLUDING DETECTORS AND FILTERS, AND THESE DESIGNERS TOOLS WILL BE EMPLOYED IN THE SOP USED WITH THE SENSOR DATA BASE PACKAGE AND SENSOR ATTRIBUTE DATA COLLECTED UNDER PHASE I AND AUGMENTED UNDER PHASE II.

SPACE TECH CORP AF
2324 MANCHESTER CT
FORT COLLINS, CO 80526
MICHAEL ANDREWS
TITLE:
ARCHITECTURAL STUDY OF ADAPTIVE ALGORITHMS FOR ADAPTIVE BEAM COMMUNICATION ANTENNA
TOPIC: 178 OFFICE: RADC/XPX

THE DEVELOPMENT OF ADAPTIVE ALGORITHMS FOR ARRAY SIGNAL PROCESSORS IS SOUGHT. THE BASIC APPROACH IS TO DESIGN HARDWARE/SOFTWARE CONFIGURATIONS OF CONVENTIONAL (VON NEUMANN) AND NON-VON NEUMANN (PARALLEL, PIPELINE, VECTOR, ARRAY, AND CUSTOM PROCESSORS) AND NONCONVENTIONAL ARITHMETIC (SBNR) TO IDENTIFY OPTIMAL ALGORITHMS (OF ORDER AREA x TIME) WHICH ARE COMPUTATIONALLY FAST YET FLEXIBLE. A TWO STEP PROCESS IS ASSUMED; FIRST THE SEQUENTIAL ALGORITHMS ARE TO BE SPEEDED-UP (SEEKING INHERENT PARALLELISM) AND SECOND, FAST ALGORITHMS ARE TO BE MAPPED ONTO NEW VLSI ARCHITECTURES (VIA RECURSION AND PIPELINING). THE PURPOSE IS TO PROVIDE THEORETICAL DESIGN TOOLS AND INTERCONNECTION STRATEGIES CAPABLE OF ACHIEVING REAL-TIME IMPLEMENTATION OF SIGNAL PROCESSING ALGORITHMS VIA LIMITED USER-PROGRAMMABLE MECHANISMS (E.G., FIRMWARE). FLEXIBLE FIRMWARE-ORIENTED ARCHITECTURES DEDICATED TO SIGNAL PROCESSING ARE TO BE DEVELOPED VIA A SYSTOLIC ARRAY MODULE FOR PERFORMING RECURSIVE LEAST-SQUARES MINIMIZATION. IT PERFORMS AN ORTHOGONAL TRIANGULARIZATION OF THE DATA MATRIX USING A PIPELINED SEQUENCE OF GIVENS ROTATIONS AND GENERATES THE REQUIRED RESIDUAL WITHOUT HAVING TO SOLVE THE ASSOCIATED TRIANGLUAR LINEAR SYSTEM BY BACK-SUBSTITUTION.

SPARTA INC AF
23293 S POINTE DR
LAGUNA HILLS, CA 92653
DR F P GIBSON
TITLE:
U.S EFFECTIVENESS AGAINST SOVIET INTERACTIVE DISCRIMINA
TOPIC: 107 OFFICE: AFBMO/PMX

THE SOVIET UNION HAS A DEFENSIVE CAPABILITY AGAINST U.S. STRATEGIC

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ATTACK AND IS COMMITTED TO FURTHER DEVELOPMENT OF THAT CAPABILITY. POTENTIAL DEVELOPMENTS IN THE 2005 TIMEFRAME INCLUDE THE POSSIBILITY OF ORBITAL DIRECTED ENERGY WEAPONS. WHILE THE PRIMARY MISSION OF SUCH WEAPONS IS EXPECTED TO BE ATTACK OF U.S. BOOSTERS AND POST-BOOST VEHICLES, IT IS ANTICIPATED THAT MANY OF THE WEAPONS WILL BE OUT OF POSITION FOR THE PRIMARY MISSION, YET STILL BE AVAILABLE FOR POTENTIAL USE IN MIDCOURSE INTERACTIVE DISCRIMINATION. IN PHASE I WE HAVE ESTABLISHED A METHODOLOGY (INVOLVING BOTH "1-ON-1" AND ENGAGEMENT SIMULATIONS) FOR EVALUATING U.S. EFFECTIVENESS IN THE FACE OF THIS THREAT AND HAVE MADE SOME PRELIMINARY ANALYSES UNDER SPECIFIC CONDITIONS OF THAT EFFECTIVENESS, PRIMARILY AGAINST NEUTRAL PARTICLE BEAM AND HIGH ENERGY LASER DISCRIMINATION CONCEPTS. POTENTIAL U.S. COUNTERMEASURES WERE IDENTIFIED. IN PHASE II WE PROPOSE TO EXTEND THESE EFFECTIVENESS ANALYSES TO A WIDER VARIETY OF CONDITIONS EXPLORING OPTIMIZATION OF DEFENSE PARAMETERS FROM A SOVIET POINT OF VIEW AND THE APPLICATION OF POTENTIAL U.S. COUNTERMEASURES TO INCLUDE, FOR EXAMPLE, ATP COUNTERMEASURES, CHANGING OF OBJECT SURFACE MATERIALS, ENHANCEMENT OF NUCLEAR BACKGROUND BY SCHEDULED PRECURSORS, AND OPTIMAL SPREADING OF DECOYS (TO INCREASE RETARGETING TIME).

SPARTA INC AF
1055 WALL ST - STE 200
LA JOLLA, CA 92037
DR LOWELL D MCMILLEN
TITLE:
COMPOSITE EROSION TEST AND MODEL DEVELOPMENT
TOPIC: 122 OFFICE: AFBMO/PMX

A STUDY IS PROPOSED TO DEVELOP COMPREHENSIVE ABLATION/EROSION RESPONSE MODELS OF FOREIGN NOSETIP AND HEATSHIELD MATERIALS. THE MODEL DEVELOPMENT WILL INCLUDE ANALYSIS AND EXPERIMENTAL TASK. MATERIAL SELECTION WILL BE DETERMINED FROM EVALUATION CURRENT AND FUTURE FOREIGN REENTRY SYSTEMS. IMPORTANT ELEMENTS OF THE PROGRAM INCLUDE TEST MATERIAL ACQUISITION, COUPLED ABLATION/EROSION MODEL DEVELOPMENT, ABLATION THERMAL TESTING, EROSION TESTING AND PERFORMANCE ASSESSMENT OF RV THROUGH EROSION ENVIRONMENTS. TEST WILL BE CONDUCTED AT HYPERVELOCITY IMPACT FACILITIES, AND DUST EROSION FACILITIES AT AEDC (HEAT-H1, DET, AND RANGE G). PERFORMANCE OF THREAT VEHICLES THROUGH COUPLED ABLATION/EROSION ENVIRONMENTS WILL BE ASSESSED TO DETERMINE SURVIVABILITY OF CURRENT AND FUTURE SYSTEMS.

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SPARTA INC AF
1104 CAMINO - DEL MAR
DEL MAR, CA 92014
STUART N ROSENWASSER
TITLE:
DEVELOPMENT OF EROSION RESISTANT RAILS FOR MULTISHOT ELECTROMAGNETIC LAUNCHERS
TOPIC: 188 OFFICE: AFATL/SAS

RAILGUNS ARE OF CONSIDERABLE INTEREST TO THE U.S. AIRFORCE AND OTHER SERVICES FOR BOTH STRATEGIC AND TACTICAL MISSIONS. ONE OF THE MAJOR TECHNOLOGY ISSUES ASSOCIATED WITH THIS CONCEPT IS THE DEVELOPMENT OF CONDUCTOR RAILS THAT WILL SURVIVE MULTIPLE RAPID FIRE BURSTS WITHOUT DETERIORATING PERFORMANCE AND WITHOUT REQUIRING FREQUENT REWORK OR REPLACEMENT. PHASE I OF THIS PROGRAM SUCCESSFULLY DEMONSTRATED THE FEASIBILITY OF AN INNOVATIVE APPROACH TO PROVIDE AN EROSION AND MELT RESISTANT REFRACTORY LAYER ON THE BORE FACING SURFACE OF THE RAIL. THE GOALS OF PHASE II ARE TO OPTIMIZE THESE LOW TEMPERATURE SOLID-STATE BONDED REFRACTORY METAL CLADDINGS AND CONDUCTIVE CARBIDE COATINGS WITH RESPECT TO EROSION RESISTANCE AND STRUCTURAL INTEGRITY; APPLY THESE CONCEPTS TO THE DESIGN AND FABRICATION DEVELOPMENT OF EROSION-STATE BONDING APPROACH; SCALE UP THE DESIGNS AND OPTIMIZED FABRICATION PROCEDURES TO PRODUCE AND INSTALL A PROTOTYPE HIGH PERFORMANCE EROSION-RESISTANT ACTIVELY COOLED RAIL SYSTEM IN AN EXISTING ADVANCED BARREL TECHNOLOGY RAPID FIRE RAILGUN; AND DEMONSTRATE THE ELECTRICAL, THERMAL AND STRUCTURAL PERFORMANCE OF THIS ADVANCED RAIL SYSTEM THROUGH A SERIES OF TESTS IN THE SELECTED RAILGUN AT EGLIN AIR FORCE BASE.

SPARTA INC SDIO
23293 S POINTE DR
LAGUNA HILLS, CA 92653
DR PHILIP D HENSHAW
TITLE:
AGILE LASER IMAGER
TOPIC: 1 OFFICE: IST

NO ABSTRACT FOR SPARTA INC

SPARTA INC (LA JOLLA OPERATIONS) AF
PO BOX 1354 - 1055 WALL ST/STE 200
LA JOLLA, CA 92038
DR HARVEY M BERKOWITZ
TITLE:
FLEXIBLE OVERLAYS FOR INFLATABLE DECOYS
TOPIC: 98 OFFICE: AFBMO/PMX

THIS PROPOSED PHASE II SMALL BUSINESS INNOVATION RESEARCH (SBIR) PRO-

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GRAM IS AN ANALYTICAL AND EXPERIMENTAL EFFORT WHICH ENCOMPASSES: (1) AN INFLATABLE BIONIC DECOY STRUCTURAL IMPULSE RESPONSE COMPUTER CODE (PROGRAM) DEVELOPMENT; (2) A THEORY VERIFICATION EXPERIMENT, USING A CYLINDRICAL MEMBRANE MODEL; (3) INFLATABLE DECOY FLEXIBLE OVERLAY CONCEPT(S) DESIGN AND (4) DESIGN TRADE, INTEGRATION, AND MANUFACTURING STUDIES; (5) A CONCEPT STRUCTURAL RESPONSE VERIFICATION EXPERIMENT INVOLVING IMPULSE LOADING OF A SUBSCALE DECOY; AND (6) AN ASSESSMENT OF THE PERFORMANCE OF THE CONCEPT, IN A NUCLEAR WEAPONS THREAT ENVIRONMENT PLUS BENIGN ENVIRONMENTS, IF IT WERE TO BE SCALED UP FOR USE IN A GENERIC MANEUVERING REENTRY VEHICLE (MARV) REPLICA DECOY CONFIGURATION. THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEVELOP A CONCEPT (OR CONCEPTS) FOR A FLEXIBLE OVERLAY (EXTERNAL NUCLEAR WEAPONS THREAT X-RAY SHIELD) FOR INFLATABLE DECOYS, AND VALIDATE ITS X-RAY INDUCED IMPULSIVE LOAD STRUCTURAL RESPONSE. THE CONCEPT IS TO BE WEIGHT EFFICIENT, CAN BE FOLDED AND PACKAGED AND THEN EXPANDED AND INFLATED, PERFORMS SATISFACTORILY IN X-RAY THREAT AND BENIGN ENVIRONMENTS, AND CAN POTENTIALLY BE UTILIZED IN A MANEUVERING REENTRY VEHICLE (MARV) REPLICA DECOY DESIGN, SUCH AS THE DESIGN CURRENTLY BEING DEVELOPED UNDER THE EVADER REPLICA PENETRATION AID (ERPA PROGRAM OR FUTURE SIMILAR DESIGNS FOR OTHER THREAT LEVELS.

SPARTA INC (LA JOLLA OPERATIONS) AF
PO BOX 1354 - 1055 WALL ST/STE 200
LA JOLLA, CA 92038
DR HARVEY M BERKOWITZ
TITLE:
LASER DAMAGE TO RV ANTENNA WINDOWS
TOPIC: 100 OFFICE: AFBMO/PMX

THE OBJECTIVES OF THIS PROPOSED PROGRAM ARE TO ESTABLISH THE HARDNESS (SURE SAFE THRESHOLD) OF ADVANCED TFS ANTENNA WINDOW CONCEPTS TO IRRADIATION, AND TO EXPERIMENTALLY IDENTIFY ANALYTICAL METHODOLOGY UTILIZED TO PREDICT THE HARDNESS LEVELS. THE ANALYTICAL AND EXPERIMENTAL EFFORT ENCOMPASSES THE USE OF FINITE ELEMENT CODE MODELS AND APPROXIMATE FORM ANALYSIS APPROACHES TO PREDICT THE DYNAMIC STRUCTURAL AND THERMOSTRUCTURAL RESPONSES OF MANEUVERING REENTRY VEHICLE (MARV) TERMINAL FIX SENSOR (TFS) ANTENNA WINDOWS TO TRACTION LOADS (HEATING AND SURFACE PRESSURE IMPULSES) RESULTING FROM LASER IRRADIATION OF THE WINDOWS, AND EXPERIMENTAL VERIFICATION OF THE PREDICTED DAMAGE THRESHOLDS. TWO TFS WINDOW TYPES WILL BE CONSIDERED, A MONOLITHIC, "MANHOLE COVER" WINDOW AND A "BUTTON ARRAY"

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CONCEPT. THE PROGRAM WILL INVESTIGATE USE OF STATE-OF-THE-ART AND ADVANCED MATERIALS IN THE ANTENNA WINDOW DESIGN. THE EXPERIMENTAL VERIFICATION WILL ENTAIL TESTING OF SUBSCALE MODEL WINDOWS. THE SURE-SAFE (NO DAMAGE) AND SURE-KILL (LOSS OF RF TRANSMITTAL CAPABILITY) THRESHOLDS WILL BE VERIFIED FOR THE MONOLITHIC WINDOW AND THE SURE-SAFE THRESHOLD WILL BE VERIFIED WITH THE BUTTON ARRAY CONCEPT, BY POST-TEST DAMAGE EVALUATION OF TEST SAMPLES AND CORRELATION AND DISPLACEMENT HISTORIES, MEASURED DURING THE TESTS, WITH PREDICTED RESPONSES.

SPECTRAL SCIENCES INC AF
111 S BEDFORD ST
BURLINGTON, MA 01803
DR JAMES W DUFF
TITLE:
FUEL DUMPS AS AN OPTICAL OBSCURANT
TOPIC: 79 OFFICE: AFBMO/PMX

THE VENTING OF ROCKET FUEL (OR OTHER SUITABLE LIQUIDS) HAS THE POTENTIAL OF PROVIDING A RELATIVELY SIMPLE AND EFFECTIVE TECHNIQUE FOR OPTICAL OBSCURATION AT HIGH ALTITUDES. AS A LIQUID IS RELEASED IN SPACE, IT UNDERGOES A FLASH EVAPORATION AND SUBSEQUENT COOLING WHICH RESULTS IN A CLOUD OF VAPOR AND PARTICLES. DURING PHASE I OF THE AIR FORCE 1985-1986 SBIR PROGRAM, SPECTRAL SCIENCES, INCORPORATED INVESTIGATED THE APPLICABILITY OF FUEL VENTING AS A MASKING TECHNIQUE. POTENTIAL INFRARED RADIATION RESULTS FROM: (1) VIBRATIONALLY EXCITED MOLECULES RESULTING FROM COLLISIONS WITH THE ATMOSPHERE AND CHEMILUMINESCENT REACTIONS, AND (2) SCATTERING OF SOLAR OR EARTHSHINE RADIATION BY PARTICLES. THE MAJOR PHASE I OBJECTIVES WERE TO PREDICT THE LWIR RADIATION SIGNATURE DUE TO THE SCATTERING OF EARTHSHINE RADIATION FOR SPECIFIED OPERATIONAL SCENARIOS. THE PROPOSED PHASE II EFFORT WOULD FOCUS ON THE USE OF MOLECULAR COMPONENT OF THE FUEL DUMP SIGNATURE AS AN ENDATMOSPHERIC MASKING TECHNIQUE. THE IMPORTANT PARAMETERS AFFECTING THE PERFORMANCE OF FUEL DUMP CONCEPT WILL BE IDENTIFIED, BASED ON THE PROPOSED CALCULATIONS. A EXPERIMENT WILL BE DEFINED TO RESOLVE ANY MAJOR TECHNICAL ISSUES.

SPECTRON DEVELOPMENT LABS INC AF
3303 HARBOR BLVD - STE G3
COSTA MESA, CA 92626
DR CECIL F HESS
TITLE:
A LIGHT SCATTERING TECHNIQUE TO MEASURE THE SIZE DISTRI
OF PARTICLES IN LASER VELOCIMETRY
TOPIC: 38 OFFICE: AFWAL/FI

A LIGHT SCATTERING TECHNIQUE TO MEASURE THE SIZE OF PARTICLES IN

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ADDITION TO THEIR VELOCITY IN LASER DOPPLER VELOCIMETRY IS PROPOSED. THE STUDIES CONDUCTED DURING PHASE I SHOW THE FEASIBILITY OF THE INTENSITY RATIOING TECHNIQUE UNDER LABORATORY CONTROLLED EXPERIMENTS. IN PHASE II, A WORKING PROTOTYPE WILL BE PRODUCED AND DEMONSTRATED AT WRIGHT-PATTERSON'S FACILITIES. BOTH THEORETICAL AND EXPERIMENTAL STUDIES HAVE SHOWN THAT THE INTENSITY RATIOING TECHNIQUE IS AN EXCELLENT APPROACH FOR MEASURING THE PARTICLE SIZE RANGE OF 0.5 MICROMETERS TO 4 MICROMETERS. THE TECHNIQUE MEASURES THE LIGHT SCATTERED BY PARTICLES CROSSING THE PROBE VOLUME, AT TWO DIFFERENT SOLID ANGLES. THE RATIO OF THESE TWO INTENSITIES YIELDS THE PARTICLE SIZE, WHILE THE DOPPLER FREQUENCY YIELDS THE VELOCITY. THE PHASE I STUDIES INDICATE THAT TO MEASURE THE FLOWS EXPECTED AT WRIGHT-PATTERSON'S FACILITIES, A MORE POWERFUL LASER AND FASTER ELECTRONIC PROCESSOR ARE NECESSARY. THESE ELEMENTS WILL BE PART OF THE ADVANCED PROTOTYPE DEVELOPED DURING PHASE II.

SPIRE CORP AF
PATRIOTS PARK
BEDFORD, MA 01730
PIRAN SIOSHANSI
TITLE:
SELF-LUBRICATING DIAMOND-LIKE COATINGS OF BORON NITRIDE
ION BEAM ENHANCED DEPOSITION
TOPIC: 53 OFFICE: AFWAL/ML

THERE IS A STRONG DEMAND FOR DIAMOND-LIKE COATINGS OF BORON NITRIDE (BN) IN A LARGE NUMBER OF TRIBOLOGICAL APPLICATIONS INCLUDING CRYOGENIC BEARINGS AND ADIABATIC ENGINES. COMMERCIAL USE OF BN COATINGS HAS PREVIOUSLY BEEN IMPEDED BY SAMPLE TO SAMPLE REPRODUCIBILITY PROBLEMS WHICH HAVE BEEN OVERCOME BY THE INNOVATIVE SPIRE PROCESS USING ION BEAM ENHANCED DEPOSITION. THE RESULTS OF THE PHASE I RESEARCH WERE EXTREMELY ENCOURAGING, PRODUCING COATINGS WITH KNOOP HARDNESS GREATER THAN 2500 Kg/mm2 AND DIMENSIONLESS WEAR COEFFICIENTS APPROACHING 10 -7. SPIRE CORPORATION PROPOSES TO EXPAND BOTH THE SCOPE AND EXTENT OF PHASE I RESEARCH TO OBTAIN THE OPTIMUM PROCESS PARAMETERS WHICH WILL BE USED FOR COMMERCIAL SCALE-UP. THESE WILL INCLUDE ION DOSE, ION ENERGY, DEPOSITION RATE, AMBIENT GAS BACKGROUND, LOCAL TEMPERATURE AND LAYER THICKNESS. IN ADDITION TO THESE, ION PLATING AND ION BEAM ENHANCED DEPOSITION (IBED) WILL BE EVALUATED FOR THEIR ABILITY TO DEPOSIT COMMERCIALLY VIABLE DIAMOND-LIKE BN COATINGS AND THE BEST COATING PARAMETERS WILL BE IDENTIFIED. AFTER PROCESS OPTIMIZATION BEARING COMPONENTS WILL BE COATED WITH CUBIC BORON

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NITRIDE (CBN) FOR EVALUATION IN REAL TIME EQUIPMENT. THE PHASE I DATA HAVE INDICATED THAT THE FULL POTENTIAL OF "DIAMOND-LIKE" BN COATINGS MAY BE DEMONSTRATED AS COMMERCIALLY FEASIBLE IN THE SHORT TERM AS A RESULT OF PHASE I INVESTIGATIONS.

SPIRE CORP AF
PATRIOTS PARK
BEDFORD, MA 01730
DR PIRAN SIOSHANSI
TITLE:
IMPROVED PROPERTIES OF TRANSPARENT PLASTICS BY ION BEAM PROCESSES
TOPIC: 56 OFFICE: AFWAL/ML

PHASE I STUDY HAS CLEARLY SHOWN THAT ION BEAM PROCESSING OF POLY-CARBONATES/ACRYLIC CAN POSITIVELY INFLUENCE THEIR SURFACE PROPERTIES. FLUORINE ION IMPLANTATION HAS BEEN SHOWN TO BE EFFECTIVE IN DECREASING THE SURFACE ENERGY OF PLASTICS AND MAKING THEM MORE HYDROPHOBIC, HOWEVER, IT DOES NOT IMPROVE THEIR MECHANICAL PROPERTIES. ON THE OTHER HAND, THE ION IMPLANTATION OF CERTAIN SPECIES SUCH AS ALUMINUM OR TITANIUM HAS PROVED TO SIGNIFICANTLY INCREASE HARDNESS OF PLASTICS AND DRASTICALLY IMPROVE THEIR RESISTANCE TO ABRASIVE WEAR AND CHEMICAL ATTACK FROM MANY SOLVENTS. THUS, THE PROCESS WILL BE OF GREAT IMPORTANCE IN PROTECTING THESE SURFACES AGAINST THE CRAZING PHENOMENON. THE RESULTS ARE VIEWED AS A MAJOR BREAKTHROUGH IN SURFACE TREATMENT OF PLASTICS AND HAVE ENCOURAGED US TO SUBMIT A PHASE II PROPOSAL TO SYSTEMATICALLY STUDY THE EFFECT OF ION IMPLANTATION FOR PROCESSING PLASTICS WITH A MUCH SUPERIOR SURFACE. PHASE II PROGRAM WILL IDENTIFY THE OPTIMUM ION IMPLANTATION CONDITIONS (CHOICE OF ION SPECIES, DOSE, AND ENERGY) AND WILL BROADEN THE SCOPE OF THE WORK TO INVESTIGATE OTHER ION BEAM TECHNOLOGIES SUCH AS ION BEAM MIXING AND ION BEAM ENHANCED DEPOSITION (IBED) PROCESSES FOR SURFACE MODIFICATION OF POLYCARBONATE/ACRYLIC MATERIALS.

SPIRE CORP AF
PATRIOTS PARK
BEDFORD, MA 01730
STANLEY VERNON
TITLE:
SUPERLATTICE BUFFER LAYERS FOR LOW-DEFECT GaAs EPITAXIA ON IMPERFECT GaAs SUBSTRATES
TOPIC: 59 OFFICE: AFWAL/ML

THE LACK OF REPRODUCIBLY UNIFORM, LOW-DEFECT GaAs MATERIAL REMAINS A

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MAJOR OBSTACLE TO THE DEVELOPMENT OF ADVANCED MICROWAVE DEVICE TECHNOLOGIES, ESPECIALLY DIGITAL AND MONOLITHIC MICROWAVE INTEGRATED CIRCUITS. SPIRE PROPOSES TO CIRCUMVENT THE SHORTCOMINGS OF MELT-GROWN GaAs WAFERS BY MEANS OF SUPERLATTICE BUFFER LAYERS, WHICH ACT AS BARRIERS TO THREADING DISLOCATIONS IN ADDITION TO PROVIDING UNIFORM AND DAMAGE-FREE SUFACES. IN PHASE I, SPIRE FABRICATED GaAs/AlAs AND LOW-MISFIT GaAs/Ga(As,P) SUPERLATTICES AND ASSESSED THEIR EFFECTIVENESS AS DISLOCATION BARRIERS. IT WAS SHOWN THAT THE SUPERLATTICE BUFFER LAYER IS A FEASIBLE ROUTE TO IMPROVE LEC WAFERS, AND THAT SUCH SUPERLATTICES COULD BE FORMED IN A PRODUCTION-SCALE MO-CVD REACTOR. IN PHASE II, SPIRE PROPOSES TO UNDERTAKE RESEARCH TO OPTIMIZE SUCH STRUCTURES, TO EXTEND THIS WORK TO InGaAs/GaAsP STRAINED-LAYER SUPERLATTICES, AND TO SCALE THE MO-CVD SUPERLATTICE GROWTH TECHNIQUE UP TO THREE-INCH WAFERS. DEVELOPMENT OF IMPROVED CHARACTERIZATION TECHNIQUES IS ALSO PROPOSED.

SPRINGBORN LABS INC NAVY
10 SPRINGBORN CENTER
ENFIELD, CT 06082
DR BERNARD BAUM
TITLE:
REPAIR KIT FOR NAVY CHEMICAL WARFARE PROTECTIVE OUTERGA
TOPIC: 43 OFFICE: NAVSUP

*SMALL TEARS IN MODACRYLIC/NYLON CHEMICAL WARFARE PROTECTIVE OVERGARMENTS CAN BE REPAIRED WITHOUT HEAT, BY USE OF A PATCH OF THE SAME MATERIAL, BONDED BY AN ADHESIVE WHICH IS PRESSURE-SENSITIVE. LATEX-BASED, SOLVENT-ACTIVATED, 2-PART REACTIVE SYSTEM, OR MICROENCAPSULATED REACTIVE SYSTEM.

SPRINGBORN LABS INC ARMY
10 SPRINGBORN CENTER
ENFIELD, CT 06082
JAMES P GALICA
TITLE:
PIPELINE CORROSION AND FRICTION REDUCTION COATINGS
TOPIC: 59 OFFICE: BRDC

THE OBJECTIVE OF THIS PROGRAM IS TO QUALIFY COMMERCIAL COATINGS FOR TACTICAL PIPELINE APPLICATIONS. FOLLOWING THIS QUALIFICATION, A MATERIAL SPECIFICATION WILL BE ESTABLISHED TO IDENTIFY OTHER SUITABLE COATINGS WHICH OFFER ADVANTAGES OF CORROSION RESISTANCE AND LOW

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FRICTION CHARACTERISTICS. THIS PROGRAM SCREENS THREE SELECT CANDIDATE COATINGS IDENTIFIED IN THE PHASE I PROGRAM. SCREENING WILL CONSIST OF EXTENSIVE EVALUATIONS IN THE LABORATORY AS WELL AS UNDER ACTUAL FIELD CONDITIONS. EACH COATING WILL BE DIP APPLIED ONTO SMALL LABORATORY TEST SPECIMENS AS WELL AS 1000 FOOT LENGTHS OF TACTICAL PIPELINE. FOLLOWING THE COATING APPLICATION, EACH WILL BE EVALUATED FOR ITS CORROSION, ADHESION, AGING, AND COATING INTEGRITY CHARACTERISTICS IN THE LABORATORY AND FIELD EVALUATED FOR ITS FRICTION AND CORROSION CHARACTERISTICS UNDER IN-SERVICE CONDITIONS.

SRS TECHNOLOGIES ARMY
1811 QUAIL ST
NEWPORT BEACH, CA 92660
NORMAN F BATES
TITLE:
OWN JAMMING EXCISION
TOPIC: 50 OFFICE: CECOM/SWL

NO ABSTRACT FOR SRS TECHNOLOGIES

SRS TECHNOLOGIES SDIO
1811 QUAIL ST
NEWPORT BEACH, CA 92660
R C EVANS
TITLE:
INTERFEROMETRIC BOOST PHASE DISCRIMINATION SYSTEM
TOPIC: 1 OFFICE: IST

NO ABSTRACT FOR SRS TECHNOLOGIES

ST*AR CORP AF
PO BOX 3385
LAWRENCE, KS 66044
DR K SAM SHANMUGAN
TITLE:
A SIMULATION BASED COMMUNICATION NETWORK ANALYSIS AND SYNTHESIS SYSTEM
TOPIC: 167 OFFICE: RADC/XPX

PERFORMANCE EVALUATION AND VULNERABILITY ANALYSIS ARE CENTRAL ISSUES IN THE DESIGN OF MILITARY COMMUNICATION NETWORKS. IT IS EXTREMELY DIFFICULT TO OBTAIN ANALYTICAL SOLUTIONS TO THE PROBLEMS OF TOPO-

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LOGICAL DESIGN, ROUTING AND MANAGEMENT OF TACTICAL MILITARY COMMUNICATION NETWORKS EXCEPT FOR SOME OVER-SIMPLIFIED CASES. THE DIFFICULTIES ARISE DUE TO THE DIVERSE MEDIA USED, ECM, UNIT MOBILITY AND THE LOSS OF TRANSMISSION LINKS AND NODES. SIMULATIONS CAN PLAY AN IMPORTANT ROLE IN THE ANALYSIS AND DESIGN OF MILITARY AS WELL AS COMMERCIAL COMMUNICATION NETWORKS. THE MAIN OBJECTIVE OF THE PROPOSED R AND D PROGRAM IS TO DEVELOP A FLEXIBLE, COMPUTATIONALLY EFFICIENT AND USER-FRIENDLY SIMULATION PACKAGE THAT CAN BE USED TO ANALYZE AND DESIGN A VARIETY OF COMMUNICATION NETWORKS. UNDER A SBIR PHASE I CONTRACT, ST*AR CORPORATION HAS DEFINED THE REQUIREMENTS FOR A STATE-OF-THE-ART NETWORK SIMULATOR, DEVELOPED A PROTOTYPE SIMULATOR AND DEMONSTRATED THE FEASIBILITY OF SIMULATION BASED NETWORK ANALYSIS AND DESIGN, AND IDENTIFIED SEVERAL RESEARCH PROBLEMS. THIS PHASE II PROPOSAL IS FOR COMPLETING THE RESEARCH, AND DEVELOPING AND TESTING A FULL VERSION OF THE SYSTEM.

STANFORD TELECOMMUNICATIONS INC NAVY
6888 ELM ST
McLEAN, VA 22101
AARON WEINBERG
TITLE:
NOVEL SIGNAL PROCESSING AND IMPLEMENTATION TECHNIQUES F
INTERFERENCE DETECTION AND CHARACTERIZATION
TOPIC: 28 OFFICE: NESC

*THERE IS A GROWING NEED TO ACTIVELY MONITOR RADIO COMMUNICATION CHANNELS AND RECEIVER CIRCUITS FOR THE PRESENCE OF INTENTIONAL OR UNINTENTIONAL INTERFERENCE THAT MAY DEGRADE LINK QUALITY. THE MULTIPLICITY OF SIGNAL FORMATS AND INTERFERENCE TYPES MAKES THE TASK OF DEVELOPING ROBUST MONITORING TECHNIQUES A DIFFICULT ONE. IT MUST ALSO BE RECOGNIZED THAT SUCH MONITORING TECHNIQUES SHOULD IDEALLY BE IMPLEMENTED IN A FASHION WHICH MAXIMIZES COMPACTNESS, COST EFFECTIVENESS AND OPERATOR EFFICIENCY, PRECLUDES THE NEED FOR ALTERATION OF EXISTING EQUIPMENT BY SERVING AS MODULAR ADDITIONS ONLY, FACILITATES UTILIZATION BY MOBILE PLATFORMS, AND, IF POSSIBLE, SUPPORTS NOT ONLY INTERFERENCE DETECTION BUT CHARACTERIZATION AS WELL. TOWARD THIS END, THE GOALS OF THE PROPOSED RESEARCH ARE TO DEVELOP NOVEL TECHNIQUES AND CONCEPTUAL EQUIPMENT DESIGNS FOR INTERFERENCE DETECTION/CHARACTERIZATION OVER A BROAD RANGE OF SIGN AND INTERFERENCE TYPES OF INTEREST; THE DESIGNS SHOULD REFLECT BOTH NOVEL APPLICATIONS AND ADVANCING TECHNOLOGIES AND AN APPROPRIATE MIX OF HARDWARE AND SOFTWARE PROCESSING. AN INITIAL PERFORMANCE ASSESSMENT - VIA ANALYSIS AND

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SIMULATION -- IS TO BE CONDUCTED TO THEORETICALLY DEMONSTRATE THE VIABILITY OF THE PROPOSED APPROACHES IN TERMS OF ACCURACY AND SPEED OF THE DETECTION/CHARACTERIZATION PROCESS.

STANFORD TELECOMMUNICATIONS INC AF
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MCLEAN, VA 22101
EDWIN ZAKRZEWSKI
TITLE:
THE EXPERT SYSTEM AUTONOMOUS TEST BED (EXACT)
TOPIC: 142 OFFICE: AFSTC/XNR

THIS PHASE II EFFORT PROPOSES TO DEVELOP A FULLY INTEGRATED AND OPERATIONAL TESTBED, WHICH WOULD ALLOW FOR THE TRADEOFF OF ALTERNATIVE SATELLITE CONTROL FUNCTION ALLOCATIONS IN ORDER TO ASSESS THE DEGRESS AND VIABILITY OF SATELLITE AUTONOMY AND TO MAXIMIZE THE SYSTEM SURVIVABILITY AND MISSION PERFORMANCE UNDER TECHNOLOGICAL AND PROGRAMMATIC CONSTRAINTS. IN PARALLEL TO DEVELOPING THIS TESTBED, A DEMONSTRATION EXPERIMENT WILL BE DEVELOPED TO ILLUSTRATE THE BENEFITS WHICH CAN BE DERIVED FROM USING AI TECHNOLOGY TO INCREASE AUTONOMY. THIS EXPERIMENT WILL BE BASED UPON TT&C FUNCTIONS FOR THE DSCS-III SATELLITES (NAMELY HEALTH AND STATUS MONITORING AND FAULT ISOLATION), AND WILL DEMONSTRATE THE EFFECTS OF VARYING PLACEMENT OF THESE FUNCTIONS AND THE DEPTH OF KNOWLEDGE REQUIRED FOR PLACEMENT AT THE SIGHT. THE TESTBED WILL INTEGRATE THESE EXPERIMENTS WITH THE SIMULATION ENVIRONMENTS DEVELOPED DURING PHASE I, RESULTING IN A MULTI-LEVEL NETWORK MODEL FOCUSED ON THE EMULATION OF THE AUTONOMOUS CAPABILITIES.

STEINBRECHER CORP ARMY
185 NEW BOSTON ST
WOBURN, MA 01801
DR DEAN F PETERSON
TITLE:
EFFICIENT WIDEBAND IMPATT-DIODE POWER COMBINERS FOR HIG POWER EHF APPLICATIONS
TOPIC: 33 OFFICE: LABCOM/ETDL

A PHASE II DEVELOPMENT EFFORT WILL EXTEND AND UTILIZE THE PHASE I TECHNOLOGY TO DEMONSTRATE COMPACT, LIGHTWEIGHT, LOW-COST AND RELIABLE SOLID-STATE POWER GENERATOR FOR EHF APPLICATIONS. THE IMPROVEMENTS ARE EXPECTED TO HALVE THE COST OF PRODUCING MULTIWATT POWER LEVELS AT MM-WAVE FREQUENCIES WHILE ENHANCING RELIABILITY AND CUTTING

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SIZE AND WEIGHT OF PRESENT SYSTEMS BY A FACTOR OF THREE OR MORE. THE PHASE II EFFORT WILL DEMONSTRATE THESE TECHNOLOGICAL IMPROVEMENTS IN A COMPACT DESIGN AND REALIZATION OF A 20 TO 25 WATT EHF POWER AMPLIFIER FOR MILSTAR APPLICATIONS. IN ADDITION, THE EIGHTEEN MONTH PROGRAM WILL EXTEND THE PHASE I IMPATT COMBINER TECHNOLOGY TO HIGHER LEVELS AND TO PLANAR DESIGNS FOR FURTHER SIZE REDUCTION, DEVELOP AND IMPLEMENT ASSOCIATED LOW-COST MANUFACTURING TECHNIQUES, AND INVESTIGATE IMPROVEMENTS IN SYSTEM RELIABILITY THROUGH DIODE REDUNDANCY. THE RESULT OF PHASE II WILL BE IMPROVED TECHNOLOGY TO MEET THE DEMANDS OF MODERN MM-WAVE SOLID-STATE POWER GENERATING SYSTEMS.

SUNBURST RECOVERY INC AF
PO BOX 1173
STEAMBOAT SPRINGS, CO 80477
CHAPMAN YOUNG
TITLE:
CONTROLLED FRACTURE TECHNIQUES FOR RAPID EXCAVATION
TOPIC: 106 OFFICE: BMO/MYSC

AN NSF FUNDED SBIR PHASE I RESEARCH PROJECT TO STUDY SMALL-CHARGE BLASTING WITH A SPECIAL CONTROLLED-FRACTURE GEOMETRY HAS REVEALED THREE KEY FACTORS WHICH IMPROVE SIGNIFICANTLY THE PROSPECTS FOR A VIABLE CONTINUOUS DRILL AND BLAST SYSTEM. THE NSF PROGRAM DEMONSTRATED THAT CONSISTENT FRAGMENTATION CAN BE ACHIEVED BY A 'PENETRATING CONE' FRACTURE INITIATED FROM THE BOTTOM OF SHALLOW BOREHOLES. PROPELLANT CHARGES WERE DEMONSTRATED TO NOT CAUSE THE BOREHOLE DAMAGE CHARACTERISTIC OF EXPLOSIVE CHARGES, AND WITH BETTER GAS RETENTION WERE MUCH MORE EFFECTIVE IN ACHIEVING FRACTURE PROPAGATION AND EFFICIENT ROCK EXCAVATION. LARGE INERTIAL STEMMING DEVICES WERE FOUND TO FURTHER IMPROVE THE RETENTION OF EXPLOSIVE AND PROPELLANT GASES, AND CONSEQUENTLY FRAGMENTATION. WITH APPROPRIATE BOREHOLE GEOMETRY, PROPLLANT RATHER THAN EXPLOSIVE CHARGES AND PROPER STEMMING, EXCAVATION EFFICIENCIES BETTER THAN 3.0 J/cc WERE ACHIEVED, VERSUS THE 25 J/cc TYPICAL OF CONVENTIONAL DRILL AND BLAST OPERATIONS. THE LOW AIR BLAST AND FLY-ROCK VELOCITIES RESULTING FROM THE PROPERLY STEEMED AND PROPELLANT CHARGED HOLES WOULD POSE LITTLE HAZARD TO A MACHINE OPERATING CONTINUOUSLY AT THE FACE OR TO SYSTEMS AND PERSONNEL IN THE IMMEDIATE VICINITY.

SYNERTECH INC ARMY
1011 E MAIN ST
RICHMOND, VA 23219
DR T S SUDARSHAN
TITLE:
DEVELOPMENT OF A COMPUTERIZED DATA BASE TO MONITOR WHEE
VEHICLE CORROSION
TOPIC: 70 OFFICE: TACOM

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP AND TEST A PROTOTYPE

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COMPUTERIZED CORROSION DATA BASE PROGRAM THAT WILL EFFECTIVELY MONITOR CORROSION DAMAGE TO THE ARMY'S TACTICAL WHEEL VEHICLE FLEET. THE PROTOTYPE PROGRAM WILL BE DEVELOPED USING ASHTON TATE'S dBASE III PLUS PACKAGE AND AN IBM PC AT WITH DUAL DRIVES, ONE OF WHICH CONTAINS A 30 MEGABYTE HARD DISK, WITH 3 MEGABYTES OF RAM. THE SYSTEM WILL BE DESIGNED TO MONITOR EXTERNAL AND INTERNAL VEHICULAR CORROSION THROUGH ON SITE INSPECTIONS OF EXTERNAL PROBLEMS AND FAILURE ANALYSIS OF SELECTED INTERNAL PARTS. ADDITIONALLY, THE MONITORING SYSTEM WILL IDENTIFY AND CLASSIFY CORROSION PROBLEMS WITH NEW SPARE PARTS AND WILL AUTOMATICALLY IDENTIFY VEHICULAR INTERNAL PARTS FOR FAILURE ANALYSIS WHEN THE FAILURE RATES OF THOSE FAILED PARTS IS EQUAL TO OR GREATER THAN 10% ABOVE THE MANUFACTURERS PREDICTED SERVICE LIFE. AFTER DEVELOPMENT AND TESTING OF THE SYSTEM AT THE FIELD UNIT LOCATIONS, A METHODOLOGY FOR EXPANSION OF THE PROGRAM FOR WORLD WIDE IMPLEMENTATION WILL CONCLUDE THE PHASE II PROJECT.

SYNETICS CORP NAVY
100 MAIN ST
READING, MA 01867
WILLIAM F O'HALLORAN
TITLE:
VOICE RECOGNITION/SYNTHESIS TECHNOLOGY
TOPIC: 37 OFFICE: NAVSEA

*THE TACTICAL ACTION OFFICER (TAO) OR BATTLE GROUP COMMANDER (BGC) IS FACED WITH MAKING DECISIONS IN REAL-TIME WITH A HEAVY RELIANCE ON TACTICAL DISPLAYS AND ONBOARD COMPUTERS FOR TACTICAL COMMAND CONTROL. EMERGING TECHNOLOGIES SUCH AS AUTOMATIC SPEECH RECOGNITION (ASR) AND COMPUTER VOICE RESPONSE (CVR) ARE BECOMING INCREASINGLY SOPHISTICATED AND COST EFFECTIVE. THIS PROPOSAL ADDRESSES THE USE OF ASR AND CVR FOR NAVAL COMMAND AND CONTROL. SPECIFICALLY, IT ADDRESSES THESE TECHNOLOGIES TO ENHANCE THE EFFECTIVENESS OF THE DECISION MAKING FUNCTIONS OF THE TAO AND BGC VIA THE SHIPBOARD SCREEN DISPLAY. TO THIS END, THE STATE-OF-THE-ART IN ASR AND CVR ARE PRESENTED AND IT IS SHOWN HOW THESE TECHNOLOGIES COULD BE USED TO ENHANCE C2 FUNCTIONS. A PLAN TO UTILIZE THESE TECHNOLOGIES WITH EMPHASIS ON TRAINING AND PERFORMANCE MONITORING AS APPLIED TO A SPECIFIC C2 FUNCTION IS CONTAINED HEREIN. IT IS ALSO SHOWN HOW A FACET OF AI (NATURAL LANGUAGE) COULD BE ALSO UTILIZED WITH ASR AND CVR. FINALLY, A PLAN TO DEVELOP A DETAILED SPECIFICATION FOR DEMONSTRATION IS PRESENTED.

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SYSTEMS ENGINEERING FOR POWER ARMY
7833 WALKER AVE
GREENBELT, MD 20770
DR WILLIAM BENNETT
TITLE:
DISTRIBUTED DECISION AIDS FOR MANAGEMENT AND CONTROL OF ARMY HELICOPTER OPERATIONS
TOPIC: 26 OFFICE: CECOM/ADP

WE PROPOSE TO DEVELOP DISTRIBUTED AUTOMATED DECISION AIDS FOR MANAGEMENT AND CONTROL OF ARMY HELICOPTER OPERATIONS. THE METHODOLOGY PROPOSED UTILIZES A COMBINATION OF ADVANCED SCHEDULING ALGORITHMS, DATABASE MANAGEMENT, EXPERT SYSTEMS, AND INTERACTIVE SOFTWARE SYSTEMS. THE RESULTING SCHEDULING SYSTEM IS MANAGED BY SEVERAL AGENTS (OFFICERS), CORRESPONDING TO MODILE NODES OF THE COMMUNICATION NETWORK OF THE ADDCOMPE. THE AGENTS ALLOCATE AND SCHEDULE HELICOPTER MISSIONS INDEPENDENTLY, WHILE INFORMING THE COMMON DATABASE OF THEIR ACTIONS AND STATUS OF THE RESOURCE. IN THE EVENT THAT THE HELICOPTER RESOURCE REACHES A CRITICAL STATE, DETERMINED BY A HIGHER LEVEL, COLLABORATION WITH THE OTHER MANAGING AGENTS. THE SYSTEM PROPOSED HOLDS PROMISE TO INCREASE RESPONSIVENESS, EFFICIENCY AND SURVIVABILITY OF HELICOPTER OPERATIONS MANAGEMENT IN A SIGNIFICANT WAY. IT INCLUDES SEVERAL INHERENTLY DISTRIBUTED CHARACTERISTICS, REQUIRED FOR ADDCOMPE APPLICATIONS. IT UTILIZES A DISTRIBUTED DATABASE; IT EMPLOYS INTER-AGENT DISTRIBUTED COMMUNICATIONS AND COMPUTATIONS; IT INVOLVES SYNCHRONOUS AND ASYNCHRONOUS DECISIONS BY VARIOUS NETWORK NODES (AGENTS).

TACAN AEROSPACE CORP NAVY
2111 PALOMAR AIRPORT RD - STE 100
CARLSBAD, CA 92008
MICHAEL M SALOUR
TITLE:
IMPROVED TEMPERATURE SENSING SYSTEMS/INSTRUMENTATION
TOPIC: 126 OFFICE: NWSC

*WE PROPOSE A NOVEL TRANSMISSION FIBER OPTIC TEMPERATURE SENSOR CONSISTING OF A SEMICONDUCTOR PLATELET SANDWICH BETWEEN TWO PARALLEL FIBER ENDS. A NEW MEASUREMENT CONFIGURATION ELIMINATES NOT ONLY THE INFLUENCE OF THE FIBER ABSORPTION BUT ALSO THE INFLUENCE OF THE COUPLING FACTOR OF THE FIBER COUPLER ON THE MEASUREMENT RESULT. BECAUSE OF ITS INHERENT GEOMETRIC VERSATILITY, COMPACTNESS, SENSITIVITY, SIMPLICITY, AND ITS IMMUNITY FROM ELECTROMAGNETIC INTERFERENCE, THIS

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SENSOR HAS POTENTIAL APPLICATIONS IN MANY FIELDS. THE SYSTEM, UTILIZING SAPPHIRE FIBER AND A HIGH TEMPERATURE POLYMERIC PLATELET, SHOULD OPERATE IN THE RANGE OF THE AMBIENT TO 1500 DEG F TEMPERATURE ENVIRONMENT. THE ELECTRONIC DIGITAL READOUT SYSTEM SHOULD PROVIDE REAL-TIME READOUT ASSOCIATED WITH TEMPERATURE CHANGES OF HUNDREDS OF DEGREES FAHRENHEIT IN LESS THAN ONE MILLISCEOND. A FURTHER EXPERIMENTAL CONFIGURATION TOTALLY ELIMINATES THE INFLUENCE OF INTENSITY FLUCTUATION OF THE LIGHT SOURCES AND THAT OF THE FIBER ABSORPTION AND THE COUPLING FACTOR OF THE FIBER COUPLER. IF OTHER TYPES OF PLATELETS, TRANSDUCER MATERIALS AND FIBERS ARE USED, ITS OPERATION CAN BE EXTENDED FOR HIGH AND LOW TEMPERATURE APPLICATIONS.

TECHNICAL SOLUTIONS INC ARMY
PO BOX 1148
MESILLA PARK, NM 88047
DR ALTON L GILBERT
TITLE:
FIRE CONTROL APPLICATIONS OF NI/VD
TOPIC: 14 OFFICE: ARDC

THE NORMALIZED INTERVAL/VERTEX DESCRIPTORS (NI/VD) DEVELOPED UNDER PHASE I WILL BE EXTENDED TO INCLUDE INCREASED FUNCTIONALITY, ROBUSTNESS TO NOISE, FASTER SEARCH TECHNIQUES, AND IMPROVEMENTS IN DATA BASE REPRESENTATIONS. INTEGRATED SOFTWARE FOR A TRACKER WITH A REAL-TIME IMPLEMENTATION OF THE NI/VD ALGORITHMS AND A SUBSTANTIALLY IMPROVED VIDEO TRACKER WILL RESULT. THE ARCHITECTURE WILL SATISFY SUCH DIVERSE CONSTRAINTS AS ACQUIRING AND DIGITIZING THE VIDEO IN REAL-TIME, APPLYING SUCH PRE-PROCESSING OR "ENHANCEMENT" ALGORITHMS TO THE DATA AS APPROPRIATE, SHARPENING AND EXTRACTING EDGE INFORMATION TO PROVIDE CONTOURS, DEVELOPING THE COMPLEXITY MEASURES AND NI/VD DESCRIPTORS FOR THE CONTOURS, CLASSIFICATION OF CONTOURS, AND CONTROL OF THE TRACKER FUNCTIONS AND TRACKING MOUNT. THE NI/VD ALLOWS FOR HIGH SPEED CLASSIFICATION OF OBJECTS IN IMAGERY, AND THE REAL-TIME TRACKER ARCHITECTURE PROPOSED TO SUPPORT THE PRACTICAL IMPLEMENTATION OF THE NI/VD PROCESSES WILL DEVELOP AN APPROACH USEFUL FOR FIRE CONTROL AND THE DIVERSE OTHER APPLICATIONS IMPLEMENTATION IN PHASE III IN VHSIC TYPE PRODUCTS.

TECHNICOM INTERNATIONAL CORP(MERIDIAN) AF
5113 LEESBURGH PIKE - STE 700
FALLS CHURCH, VA 22041
DR KENNETH L HAMILTON
TITLE:
NESTOR: NOSOCOMIAL EXPERT SYSTEM TESTBED FOR ORIGINAL
TOPIC: 205 OFFICE: AMD/RDO

FOR PHASE-II WE PROPOSE TO DESIGN, BUILD, TEST, AND DOCUMENT TWO

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EXPERT SYSTEMS, EACH WITH INTEGRATED AND INTEGRAL CAPABILITIES IN COMPUTER-BASED INSTRUCTION, TRAINING, AND COMPUTER-ADAPTIVE TESTING--ALL IN ADDITION TO THE DIAGNOSTIC/ADVISORY CAPABILITIES STANDARD TO EXPERT SYSTEMS. THE DOMAIN OF THE FIRST SYSTEM, NESTOR, WILL BE NOSOCOMIAL OR HOSPITAL-ACQUIRED INFECTIONS. ITS OUTPUT WILL BE AN INFERENTIALLY-DERIVED SYSTEM DIAGNOSIS OF THE LIKELY MEANS OF A PATIENT ACQUIRING A NOSOCOMIAL INFECTION AND SOME ADVICE ABOUT PREVENTING ITS FURTHER SPREAD. THE SECOND SYSTEM, ENESTOR, WILL HAVE AN EMPTY DOMAIN, SIMILAR TO EMYCIN. ENESTOR CAN BE USED BY THE AIR FORCE TO AUTHOR OR CREATE NEW EXPERT SYSTEMS WITH THE FULL FUNCTIONALITY OF NESTOR. BOTH SYSTEMS WILL TAKE FULL ADVANTAGE OF THE PHASE-I TECHNICAL RESULT; I.E., THE DEMONSTRATION THAT MULTIPLE FORMS OF KNOWLEDGE REPRESENTATION CAN BE USED COOPERATIVELY WITHIN A SINGLE EXPERT SYSTEM. WHILE THE PHASE-I DEMONSTRATION USED THIS MULTIPLE FORMS TECHNIQUE TO SEGMENT THE SYSTEM'S DOMAIN, THE PHASE-II SYSTEMS WILL USE THE TECHNIQUE TO REPRESENT KNOWLEDGE ABOUT THE SYSTEM'S FUNCTIONAL CAPABILITIES -INSTRUCTION, TRAINING, AND TESTING.

TECHNIWEAVE INC NAVY
PO BOX 314
E ROCHESTER, NH 03867
JAMES A CRAWFORD JR
TITLE:
MATERIAL AND PROCESS DEVELOPMENT FOR THE AYPEX BRAIDING METHOD
TOPIC: 94 OFFICE: NSWC

*THIS PROPOSAL DESCRIBES AN EFFORT TO IMPLEMENT THE AYPEX BRAIDING PROCESS. WORK TO BE CONDUCTED INCLUDES WEAVE DESIGN, FABRICATION DEMONSTRATION, IMPREGNATION AND TEST AND EVALUATION.

TECHNOLOGY ASSESSMENT & TRANSFER INC AF
2002 HUNTWOOD DR
GAMBRILLS, MD 21054
LARRY L FEHRENBACHER
TITLE:
IMPROVED THERMAL OXIDATIVE-DEPOSITION SCREENING TESTS F TURBINE LUBRICANTS
TOPIC: 70 OFFICE: AFWAL/PO

THE FEASIBILITY OF USING TGA, DSC AND CHEMILUMINESCENCE (CL) TECHNIQUES AS QUALITY CONTROL SCREENING AND DISCRIMINATION METHODS FOR

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THE EVAPORATION, OXIDATION AND DEPOSITION CHARACTERISTICS OF AIRCRAFT TURBINE OILS WAS DEMONSTRATED IN PHASE I. THIS PHASE II EFFORT WILL FOCUS ON (a) THE CORRELATION AND REFINEMENT OF THESE TECHNIQUES WITH LABORATORY, ENGINE SIMULATOR AND FULL SCALE ENGINE TESTS; (b) THE DEVELOPMENT OF LIFETIME PREDICTIVE TECHNIQUES FOR VOLATILITY, OXIDATION AND DEPOSIT DEGRADATION PHENOMENA; (c) THE IDENTIFICATION OF MOLECULAR STRUCTURE ENTITIES AND MECHANISMS RESPONSIBLE FOR THESE DELETERIOUS PROCESSES AND (d) THE DEVELOPMENT AND REFINEMENT OF CL AS RAPID SCREENING TOOL FOR OXIDATION RESISTIVITY.

TECHNOLOGY DEVELOPMENT ASSOCS INC AF
992 OLD EAGLE SCHOOL RD - STE 910
WAYNE, PA 19087
NICHOLAS J DISPENZIERE
TITLE:
HARDENED LIGHTWEIGHT RV AFT COVER DESIGNS
TOPIC: 112 OFFICE: AFBMO/PMX

*THE PHASE I PROGRAM SHALL IDENTIFY REENTRY VEHICLE AFT COVER DESIGNS THAT INCORPORATE MATERIALS AND DESIGN FEATURE WHICH OFFER INCREASED HARDNESS AGAINST NUCLEAR EFFECTS WHILE RETAINING LOW WEIGHT. PRO# GRAM FEASIBILITY WILL BE DEMONSTRATED BY CONDUCTION OF NUCLEAR HARDNESS AND SURVIVIBILITY (NH&S) SHOCK WAVE AND STRUCTURAL RESPONSE ANALYSIS ON UNIQUELY DEVELOPED INNOVATIVE AFT COVER DESIGN CONCEPTS.

TECHNOLOGY FOR ENERGY CORP ARMY
1 ENERGY CENTER - PELLISSIPPI PKWY
KNOXVILLE, TN 37922
DR ROBERT S HOWELL
TITLE:
FEASIBILITY STUDY FOR FIELD MONITORING OF WATER SUPPLIE RADIOACTIVITY
TOPIC: 58 OFFICE: BRDC

NO ABSTRACT FOR TECHNOLOGY FOR ENERGY CORP

TETRA CORP AF
4905 HAWKIN NE
ALBUQUERQUE, NM 87109
WILLIAM M MOENY
TITLE:
ELECTRONIC FUZE TRANSFORMER RESEARCH AND DEVELOPMENT PR
TOPIC: 185 OFFICE: AFATL/MNF

IN THIS WORK, WE PROPOSE TO EVALUATE, DESIGN, AND TEST FIVE (5)

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OPTIMUM CANDIDATES FOR ELECTRONIC FUZE APPLICATIONS. THESE CANDIDATES WERE IDENTIFIED DURING PHASE I OF THE ELECTRONIC FUZE TRANSFORMER RESEARCH AND DEVELOPMENT PROGRAM. THE KEY CRITERIA TO BE ADDRESSED IN THIS PROGRAM ARE: EFFICIENCY, RELIABILITY, SIZE, SHELF LIFE, SAFETY, AND COMPATIBILITY WITH THE ELECTRICAL ENVIRONMENT. TETRA WILL DEVELOP A TRANSFORMER DESIGN EXPERT SYSTEM TO AID THE AIR FORCE IN REDUCING DESIGN AND DEVELOPMENT TIME AND COSTS FOR FUTURE TRANSFORMERS. TETRA WILL ALSO EVALUATE, DESIGN, AND TEST DEVICES FOR THE ISOLATION AND TRANSMISSION AT ENERGY THROUGH EITHER A METALLIC OR DIELECTRIC BARRIER TO PROVIDE IMPROVED TESTABILITY OF S/A DEVICES.

TEXAS RESEARCH INSTITUTE INC NAVY
9063 BEE CAVES RD
AUSTIN, TX 78733
DR PATRICK E CASSIDY
TITLE:
AIR-FREE KEVLAR/URETHANE COMPOSITES
TOPIC: 91 OFFICE: NSWC

*THE GOAL OF THIS PROGRAM IS THE DEVELOPMENT OF ONE OR MORE METHODS (APPLICABLE TO MANUFACTURING) WHICH ALLOW THE COMPLETE SATURATION OF LARGE (140 mil DIAMETER) KEVLAR CORD WITH A POLYURETHANE RESIN. TASKS WILL INCLUDE THE SELECTION OF MATERIALS AND PROCESSING (ALREADY COMPLETED), A REVIEW OF ALTERNATE, MORE ADVANCED RESIN SYSTEMS, INVESTIGATION OF NDE METHODS TO MONITOR SUCCESS, LABORATORY IMPREGNATION AND OPTIMIZATION OF SIX TECHNIQUES AND, FINALLY, EVALUATION OF SAMPLES FROM EACH APPROACH.

THERMACORE INC ARMY
780 EDEN RD
LANCASTER, PA 17601
G YALE EASTMAN
TITLE:
ENVIRONMENTAL CONTROL PACKAGES USING BELOW AMBIENT THER STORAGE
TOPIC: 56 OFFICE: BRDC

THE LIVING SPACE ENVIRONMENT OF MILITARY VEHICLES CAN BECOME OPPRESSIVE WHEN THE VEHICLES ARE OPERATING IN HOT DRY HUMID CLIMATES. THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP A MICROCLIMATE COOLING SYSTEM (MCS) FOR PROVIDING COOL AIR TO CREW MEMBERS ON BOARD MILITARY

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VEHICLES, PARTICULARLY THOSE VEHICLES EQUIPPED WITH NUCLEAR, BIOLOGICAL AND CHEMICAL (NBC) AIR FILTERING SYSTEMS. THE MAIN GOAL FOR THIS PROGRAM IS TO DEVELOP A MCS THAT MAKES USE OF A PHASE CHANGE MATERIAL (PCM) TO STORE THERMAL ENERGY AS LATENT HEAT OF FUSION. THIS TYPE OF MCS WILL REQUIRE LESS POWER TO OPERATE THAN A CONVENTIONAL AIR CONDITIONER AND WILL OPERATE MORE EFFICIENTLY; THEREFORE, THE TOTAL ENERGY CONSUMPTION WILL ALSO BE LESS FOR THE MCS THAN FOR A CONVENTIONAL AIR CONDITIONER. THE WORK CONDUCTED DURING PHASE II WILL INCLUDE: INTEGRATING THE MCS DESIGN WITH AVAILABLE SPACE AND WITH THE AIR AND REFRIGERATION SYSTEMS ABOARD THE MILITARY VEHICLES; DESIGNING AND FABRICATING A FULL SCALE MCS FOR PROVIDING COOL AIR TO CREW MEMBERS ABOARD MILITARY VEHICLES; AND TESTING OF THE FULL SCALE MCS UNDER ACTUAL OPERATING CONDITION. THE TECHNOLOGY DEVELOPED IN THIS PROGRAM IS EXPECTED TO HAVE DIRECT APPLICATIONS TO HEATING AND COOLING OF COMMERCIAL AND RESIDENTIAL BUILDINGS.

THERMACORE INC SDIO
780 EDEN RD
LANCASTER, PA 17601
ROBERT M SHAUBACH
TITLE:
SPACECRAFT HEAT REJECTION METHODS
TOPIC: 2 OFFICE: IST

NO ABSTRACT FOR THERMACORE INC

TRACER TECHNOLOGIES ARMY
2120 W MISSION RD - STE M
ESCONDIDO, CA 92025
STEPHEN L KERRIN
TITLE:
DEVELOPMENT OF A PORTABLE DEVICE FOR DETERMINING SORPTI
CHEMICAL PROTECTIVE GARMENT MATERIALS
TOPIC: 82 OFFICE: NRDC

AN EXPERIMENTAL DEVICE HAS BEEN DEVELOPED TO DETERMINE THE SORBTIVE HISTORY OF CARBON BASED PROTECTIVE GARMENT MATERIAL. THIS METHOD USES HALOCARBON 114 AS AN ALTERNATE TO CARBON TETRACHLORIDE WITH DETECTION OF VAPOR MADE BY MEANS OF A THERMAL CONDUCTIVITY DETECTOR. EXCELLENT CORRELATION HAS BEEN DEMONSTRATED BETWEEN THIS METHOD AND THE CARBON TETRACHLORIDE METHOD. AN UPGRADED DEVICE IS PROPOSED TO ALLOW FULL PORTABILITY AND EASE OF OPERATION.

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TRACER TECHNOLOGIES AF
2120 W MISSION RD - STE M
ESCONDIDO, CA 92025
WALTER G ENGLAND
TITLE:
MODELING OF AIRCRAFT FIRE SUPPRESSION REQUIREMENTS
TOPIC: 218 OFFICE: AFESC

PHASE I OF THE STUDY RESULTED IN THE ESTABLISHMENT OF INDEPENDENT PARAMETERS NECESSARY TO ACCURATELY PREDICT FIRE CONTROL TIMES FOR POOL FIRES (WITH AND WITHOUT SIMULATED AIRCRAFT) USING AFFF AND PROTEIN FOAM SUPPRESSANTS. ANALYTICAL EXPRESSIONS OF CONTROL TIME WERE DERIVED USING BOTH THEORETICAL CONSIDERATIONS AND PUBLISHED EXPERIMENTAL DATA. PHASE II IS EXPECTED TO PROVIDE EXPERIMENTAL DATA WITH WHICH TO VALIDATE AND REFINE THE DERIVED MODELS, INCLUDING (1) DATA WHICH CAN BE USED TO SEPARATE THE IMPACTS OF THE PRESENCE OF OBSTACLES ON FIRE CONTROL, (2) INDICATIONS OF FOAM PARAMETERS AND THEIR IMPORTANCE IN THE MODELS, AND (3) NEW PRELIMIANRY MODELS OF MORE SOPHISTICATED FIRE CONFIGURATIONS. THE TESTS CONDUCTED WILL BE DESIGNED AND CAREFULLY CONTROLLED USING EXPERTS PRESENTLY PERFORMING AIR FORCE FIRE TESTS. SCATTER FROM DATA COLLECTED IN THIS MANNER IS EXPECTED TO BE MINIMAL COMPARED TO USE OF THE WIDELY PUBLISHED DATA USED IN THE MODEL DERIVATIONS DURING PHASE I. APPLICATION OF THE MODELS IS EXPECTED TO DIRECTLY IMPACT THE DESIGN OF FIRE FIGHTING SYSTEMS AND PROTOCOL ASSOCIATED WITH BOTH MILITARY AND COMMERCIAL AIRCRAFT.

TRIANGLE RESEARCH & DEVELOPMENT CORP AF
PO BOX 12696
RESEARCH TRIANGLE, NC 27709
DR DAVID P COLVIN
TITLE:
SPACECRAFT HEAT REJECTION METHODS: ACTIVE AND PASSIVE TRANSFER FOR ELECTRONIC SYSTEMS
TOPIC: 35 OFFICE: AFWAL/FI

A PHASE I PROGRAM HAS BEEN SUCCESSFULLY COMPLETED WHICH INVESTIGATED THE APPLICATION OF INNOVATIVE METHODS FOR ENHANCED HEAT TRANSPORT AND STORAGE IN AVIONICS, SPACECRAFT AND ELECTRONICS SYSTEMS. THIS TECHNIQUE UTILIZED PHASE CHANGE MATERIALS (PCMS) IN NOVEL SYSTEM ARRANGEMENTS AND ALSO SPONSORED THE DEVELOPMENT OF A SUBMINIATURE COUNTER

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FLOW HEAT EXCHANGER/THERMAL CONNECTOR. USING AN ACTIVE CLOSED FLUID LOOP DEVELOPED UNDER A NASA PHASE II EFFORT, A SLURRY OF MICROENCAPSULATED PCMS WAS USED TO SIGNIFICANTLY ENHANCE THE HEAT TRANSPORT AND STORAGE WITHIN THE SYSTEM. THE SYSTEM WAS ALSO USED TO DEMONSTRATE THE CONCEPTUAL FEASIBILITY TO REMOVE EXCESS HEAT FROM A SIMULATED MICROELECTRONICS DEVICE WITH INTERNAL 500 MICRON PASSAGES. IN ADDITION, BOTH MICROENCAPSULATED AND PURE PCM WAS USED TO PASSIVELY REDUCE THE TEMPERATURE EXTREMES OF ELECTRONIC COMPONENTS DURING TRANSIENT SURGES AS WELL AS DEMONSTRATE THE EFFECTIVENESS OF A PCM-FILLED FLEXIBLE BLANKET FOR PASSIVE SHIELDING FROM INTENSE THERMAL IRRADIATION OR CONVECTIVE LOADS. A PHASE II PROGRAM IS PROPOSED THAT WOULD PURSUE FURTHER DEVELOPMENT IN ALL OF THE ABOVE AREAS INCLUDING ADDITIONAL MATERIALS R&D AS WELL AS DEMONSTRATION TESTING.

ULTRAMET DARPA
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
INTEGRAL-BARREL ROUND-BORE RAILGUN CONCEPT
TOPIC: 12 OFFICE: DARPA

THE CURRENT STATE-OF-THE-ART IN FABRICATING BARRELS FOR RAILGUNS REQUIRES THAT SIGNIFICANT ADVANCES BE MADE IN MATERIALS AND PROCESSES TO MAKE THE RAILGUN A VIABLE WEAPON. IN PHASE I ULTRAMET DEMONSTRATED A UNIQUE INSIDE-OUT FABRICATION TECHNIQUE FOR PRODUCING A "ROUND-BORE INTEGRAL-BARREL" USING MATERIALS WHICH COMBINE WEAR RESISTANCE AND HIGH STRENGTH/WEIGHT. IN PHASE II ULTRAMET PROPOSES TO OPTIMIZE THE MATERIALS AND PROCESSES AND FABRICATE A TEST BARREL WHICH CAN BE FIRED HUNDREDS OF TIMES WITH LITTLE OR NO REWORK. BASED ON THE TECHNOLOGY CURRENTLY AVAILABLE AT ULTRAMET, WE FEEL THAT THERE IS A HIGH PROBABILITY OF SUCCESS OF THIS PROGRAM.

ULTRAMET AF
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
HAFNIA COATING FOR OXIDATION PROTECTION OF CARBON COMPO
TO 3500F (1930C) AND ABOVE
TOPIC: 43 OFFICE: AFWAL/ML

FUTURE MILITARY AND COMMERCIAL APPLICATIONS REQUIRE MATERIALS WHICH

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CAN OPERATE AT TEMPERATURES ABOVE 3000F AND STILL RETAIN THEIR STRUCTURAL INTEGRITY. THE CARBON COMPOSITE IS A STRONG POTENTIAL CANDIDATE BUT THIS MATERIAL (AS WELL AS MOST OTHER CANDIDATES) OXIDIZES ABOVE 860F. CURRENT PROTECTIVE COATING SYSTEM ARE AT BEST EFFECTIVE TO 3000F. IN PHASE I ULTRAMET DEMONSTRATED THE FEASIBILITY OF DEPOSITING A GRADED COATING OF SiC/HfC/HfO(2) BY CVD ONTO A CARBON-CARBON SUBSTRATE. OXIDATION TESTING IN AIR AT 3400F-3560F (160F TEMPERATURE UNCERTAINTY) FOR 1 1/2 HOURS SHOWED ALMOST NEGLIGIBLE WEIGHT LOSS. THESE RESULTS REPRESENT A VERY SIGNIFICANT ADVANCE OVER EARLIER WORK, ESPECIALLY SINCE THERE IS THE PROSPECT THAT THIS SYSTEM COULD BE EFFECTIVE TO 4000F. THIS PHASE II PROPOSAL DESCRIBES THE CONTINUED RESEARCH WHICH IS NECESSARY TO DEVELOP A VIABLE OXIDATION RESISTANT COATING FOR CARBON COMPOSITES WHICH WILL PROVIDE PROTECTION TO 3500F AND ABOVE.

UNIQUE MOBILITY INC NAVY
3700 S JASON ST
ENGLEWOOD, CO 80110
DAVID WRIGHT
TITLE:
RESONANT STIRLING ENGINE GENERATOR
TOPIC: 85 OFFICE: NSWC

*THIS PROPOSAL DESCRIBES THE DEVELOPMENT OF A NEW CONCEPT IN SELF CONTAINED ELECTRIC POWER GENERATORS IN THE AVERAGE POWER RANGE FROM 7 - 30 KILOWATTS. A DESIGN FOR A 10 KILOWATT UNIT SHOWS CONTINUOUS AVERAGE POWER CAPABILITY BETWEEN 2 AND 10 KILOWATTS WITH A FULL 50 KILOWATT SURGE CAPABILITY FOR FOUR SECONDS. THIS CONCEPT IS A HYBRID SYSTEM COMPOSED OF AN ADVANCED GAS CYCLE (STIRLING) ENGINE, LINEAR ALTERNATOR, ELECTROMECHANICAL SURGE POWER SOURCE, AND SOLID STATE POWER CONTROLLER. THERE ARE SEVERAL ADVANTAGES OVER CONVENTIONAL UNITS INCLUDING GREATLY REDUCED WEIGHT AND VIRTUALLY SILENT OPERATION. THE ENGINE SHOULD DELIVER HIGH FUEL EFFICIENCY AND IS ADAPTABLE TO A WIDE VARIETY OF FUELS WITH MINIMAL OR NO MODIFICATIONS. WE EXPECT EXCELLENT LONG TERM RELIABILITY AS THE ENGINE/ALTERNATOR UNIT HAS ONLY TWO MOVING PARTS WHICH ARE NOT HEAVILY STRESSED. THE ENGINE AND ALTERNATOR ARE CONTAINED IN ONE COMPACT HERMETICALLY SEALED PACKAGE. THE SURGE POWER UNIT IS ALSO HERMETICALLY SEALED WITH ONLY ELECTRICAL INPUT AND OUTPUT LINES. ALL DETAILS OF THE DESIGN ARE PROPRIETARY TO UNIQUE MOBILITY.

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UNITED INTERNATIONAL ENGINEERING INC AF
6809 BRANDYWINE LOOP NE
ALBUQUERQUE, NM 87111
DR DAVID C CHOU
TITLE:
CONTROLLING TURBULENCE STRUCTURE AND ENHANCING OPTICAL PROPAGATION
TOPIC: 145 OFFICE: AFWL/PRC

THE DISCOVERY OF LARGE-SCALE, COHERENT STRUCTURES, THEIR RECENT EMPHASIS IN RESEARCH, AND THEIR INFLUENCE ON TURBULENT FLOW CONTROL MAKE THEM AN IMPORTANT SUBJECT FOR RESEARCH. CURRENT APPLICATIONS DEMAND THOROUGH UNDERSTANDING OF THE PHYSICS. WITH THE ADVENT OF ADAPTIVE OPTICS CORRECTION SYSTEMS, ONE CAN REDUCE OPTICAL ABERRATIONS DUE TO RELATIVELY LOW FREQUENCY JITTER AS EXPRESSED BY LOW ORDER ZERNIKE POLYNOMIALS (SUCH AS PISTON, TILT, COMA, ETC.). FOR THESE REASONS, IT IS READILY APPARENT THAT ONE SHOULD 1) STIMULATE AND REINFORCE THE LARGE-SCALE, COHERENT STRUCTURE AT THE LOWER FREQUENCIES IN THE TURBULENT FLOW THROUGH WHICH THE SIGNAL PROPAGATES; 2) REMOVE THE CORRESPONDING OPTICAL DEGRADATIONS BY INCORPORATING A SUITABLE ADAPTIVE OPTICAL CORRECTION SCHEME; AND, 3) SIMULTANEOUSLY REDUCE THE HIGH FREQUENCY, SCATTERING ABERRATIONS. THIS PHASE II RESEARCH WILL ADDRESS APPROACHES TO ACCOMPLISH JUST THESE GOALS.

UNIVERSAL ENERGY SYSTEMS INC AF
4401 DAYTON-XENIA RD
DAYTON, OH 45432
A K RAI
TITLE:
A TECHNIQUE TO CHARACTERIZE THE INTERFACES PRESENT IN SEMICONDUCTOR SUPERLATTICES
TOPIC: 21 OFFICE: AFWAL/AA

IN THE PHASE I RESEARCH WE DEVELOPED A TECHNIQUE TO PREPARE CROSS (X)-SECTIONAL TRANSMISSION ELECTRON MICROSCOPE (TEM) SPECIMENS HAVING THIN SECTIONS OF THE DESIRED DEVICE REGION. THROUGH THIS WORK THE VERSATILITY OF THE X-SECTIONAL TEM TECHNIQUE HAS BEEN SHOWN IN CHARACTERIZING INTERFACIAL DEVICE REGIONS AND ALSO IN EVALUATING PROCESS DEVELOPMENT AND FAILURE ANALYSIS. IN ORDER TO MAKE THIS TECHNIQUE ECONOMICAL AND ROUTINE FOR DEVICE CHARACTERIZATION THE SUCCESS RATE OF MAKING X-SECTIONAL TEM SPECIMENS SHOULD BE HIGH. WE PROPOSE TO MAKE COMPOSITE SPECIMENS HAVING 3-4 DEVICE SLABS INSTEAD OF 1-2 SLABS IN ORDER TO INCREASE THE CHANCES OF GETTING THE DEVICE REGION THINNED.

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TO MINIMIZE THE LARGE DIFFERENCE IN THE MILLING RATE BETWEEN THE EPOXY AND THE DEVICE MATERIAL, LOW MELTING TEMPERATURE METALS AND ALLOYS WILL BE TRIED AS AN ALTERNATIVE BONDING MEDIA. ENERGY DISPERSIVE X-RAY SPECTROMETERY ANALYSIS WILL BE DONE IN CONJUNCTION WITH TRANSMISSION ELECTRON DIFFRACTION TO MONITOR THE STABILITY OF OHMIC CONTACT METALLIZATIONS UPON THERMAL AND ELECTRICAL STRESSING.

UNIVERSAL SENSORS ARMY
PO BOX 736
NEW ORLEANS, LA 70148
DR GEORGE G GUILBAULT
TITLE:
BIOMICROSENSOR TECHNOLOGY - A PROTEIN COATED PIEZOELECT CRYSTAL DETECTOR
TOPIC: 19 OFFICE: CRDC

THE USE OF ENZYMES (CHOLINESTERASE FROM VARIOUS SOURCES) AND ANTIBODIES (DIMP, PARAOXON, GB, GD AND MUSTARD) AS COATINGS ON A PIEZOELECTRIC CRYSTAL DETECTOR WILL BE INVESTIGATED FOR THE DETECTION OF ORGANOPHOSPHORUS AND MUSTARD COMPOUNDS. THE RESULTING SENSORS WILL BE EVALUATED FOR SENSITIVITY, SELECTIVITY, RESPONSE TIME, RECOVERY TIME, LINEAR RANGE, REPRODUCABILITY, LIFETIME AND EFFECT OF INTERFERENCES. A PORTABLE MICROPROCESSOR BASED INSTRUMENT WILL BE DESIGNED, BUILT AND EVALUATED FOR THE DETECTION OF CHEMICAL AGENTS.

UNIVERSAL SENSORS ARMY
PO BOX 736
NEW ORLEANS, LA 70148
DR GEORGE G GUILBAULT
TITLE:
STABILIZATION OF BIOMATERIALS - NEW TECHNIQUES
TOPIC: 18 OFFICE: CRDC

INNOVATIVE METHOD FOR THE STABILIZATION AND IMMOBILIZATION OF ENZYME AND ANTIBODIES WILL BE DEVELOPED. METHODS FOUND QUITE USEFUL IN PHASE I, I.E. TRIAZINE, DIAZO COUPLING TO COLLAGEN, AND GLUTARALDEHYDE, BINDING PROCEDURES, PLUS CHEMICAL METHODS SUCH AS POLYAZETIDINE AND BINDING TO BROMOACETYL CELLULOSE MEMBRANES, WILL BE STUDIES WITH EEL CHOLINESTERASE AND DIMP ANTIBODIES. OPERATIONAL STABILITY AS WELL AS STORAGE STABILITY UP TO 70 DEG C FOR TWO WEEKS, WILL BE INVESTIGATED.

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VERAC INC AF
9605 SCRANTON RD - STE 500
SAN DIEGO, CA 92121
DR RICHARD D BINKOWSKI
TITLE:
EXTERNAL PROTECTION MATERIAL INTEGRATED PERFORMANCE ASSESSMENT
TOPIC: 108 OFFICE: AFBMO/PMX

THIS PHASE II SBIR PROGRAM, THE EXTERNAL PROTECTION MATERIAL INTEGRATED PERFORMANCE ASSESSMENT, EVALUATES THE USE OF EXTERNAL PROTECTION MATERIAL (EPM) FOR LASER HARDENING OF BALLISTIC MISSILES. IT CONTINUES WITH THE PHASE I STUDY WITH AN EVALUATION OF THE TOP CANDIDATE EPMs FOR CONTINUOUS WAVE LASER PERFORMANCE IN A HIGH STRESS ENVIRONMENT. THE TOP CANDIDATES ARE THEN EVALUATED FOR REPETITIVELY PULSED (RP) LASER EFFECTS. THIS TASK AREA IS SIMILAR TO THE PHASE I STUDY IN THAT A RP THREAT IS IDENTIFIED, THE MATERIALS ARE EVALUATED FOR THERMAL SOAK AND BURN-THROUGH RESISTANCE, AND THE MATERIALS ARE RANKED ACCORDING TO THEIR UTILITY AS AN EPM. IN TASK AREA 3, THE TOP CANDIDATE EPMs ARE EVALUATED ON THEIR PERFORMANCE AND ABILITY TO WITHSTAND A DEFINED NUCLEAR ENVIRONMENT. TASK AREA 4, WHICH REPRESENTS THE BULK OF THE PHASE II WORK, ASSESSES THE CANDIDATE EPMs FROM A STRUCTURAL STANDPOINT. IN THIS TASK, THE AVAILABLE ADHESIVES ARE IDENTIFIED, THE BONDING CHARACTERISTICS ARE ESTABLISHED, AND THE EPM ADHESIVE LAYUPS ARE EVALUATED FOR STRUCTURAL COMPATIBILITY DUE TO HIGH STRAIN, SHEAR AND BENDING LOADING. FINALLY, THE STUDY IS CONCLUDED WITH AN INTEGRATED ASSESSMENT INCLUDING ALL THE ABOVE EVALUATIONS, AND A FINAL RANKING.

VERAC INCORPORATED NAVY
9605 SCRANTON RD
SAN DIEGO, CA 92121
DANIEL R GREENWOOD
TITLE:
EXPERT SYSTEMS FOR AUTOMATIC DIGITAL SCENE MATCHING ARE CORRELATOR (DSMAC) SCENE SELECTION AND SCENE ENHANCEMEN
TOPIC: 136 OFFICE: JCM/NSWC-DL

*VERAC PROPOSES USING ITS EXTENSIVE COMPUTER SCIENCE AND SOFTWARE EXPERTISE TO IMPROVE REFERENCE SCENE SELECTION AND ENHANCEMENT PROCEDURES FOR THE CRUISE MISSILE'S DIGITAL SCENE MATCHING AREA CORRELATOR (DSMAC). VERAC WILL APPLY EXPERT SYSTEM TECHNOLOGY TO THE SCENE SELECTION PROCESS USING KNOWLEDGE ENGINEERING METHODS TO BUILD

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A PRE-PROTOTYPE SCENE SELECTION AID. VERAC'S EXPERIENCE INCLUDES A RECENT DELIVERY TO AN OPERATIONAL SITE OF A PROTOTYPE SURVEILLANCE EXPERT SYSTEM EXHIBITING ORDERS OF MAGNITUDE IMPROVEMENT IN USER PRODUCTIVITY. THE SYSTEM DEVELOPED HERE WILL COMBINE EXPERT DECISION RULES AND STATISTICAL ANALYSIS OF CANDIDATE REFERENCE IMAGES TO SELECT THOSE WHICH HAVE A BETTER PROBABILITY OF CORRECT MATCH WITH SENSED SCENES. IN ADDITION, VERAC WILL INVESTIGATE THE APPLICATION OF ADAPTIVE IMAGE PROCESSING ALGORITHMS AND OR OPERATORS IN ORDER TO REDUCE IMAGE NOISE AND ENHANCE THOSE IMAGE FEATURES DETERMINED TO BE OF IMPORTANCE TO SCENE MATCHING.

VISIDYNE INC AF
10 CORPORATE PL + S BEDFORD ST
BURLINGTON, MA 01803
ORR SHEPHERD
TITLE:
RAMAN DETECTION FOR BALLOONBORNE LIDAR
TOPIC: 156 OFFICE: AFGL/XOP

IT HAS BEEN SUCCESSFULLY DEMONSTRATED, THROUGH COMPUTER SIMULATION AND LABORATORY DEVELOPMENT, DURING THE PHASE I EFFORT, THAT THE COMBINING OF RAMAN LIDAR WITH RAYLEIGH LIDAR PROVIDES A POWERFUL NEW TECHNIQUE FOR SEPARATING THE ATMOSPHERIC AEROSOL BACKSCATTER AND EXTINCTION COEFFICIENTS FROM RAYLEIGH SCATTERING. IT HAS ALSO BEEN DEMONSTRATED THAT RAMAN LIDAR CAN BE USED TO MEASURE TRACE ATMOSPHERIC CONSTITUENTS. TO IMPLEMENT THIS NEW MEASUREMENT TECHNIQUE, IT IS PROPOSED TO: 1. DEVELOP A RAMAN LIDAR SYSTEM FOR BALLOONBORNE MEASUREMENT, 2. PERFORM ATMOSPHERIC MEASUREMENTS OF RAMAN AND RAYLEIGH BACKSCATTERING AT SELECTED WAVELENGTHS TO DETERMINE a) SELECTED SPECIES CONCENTRATIONS AS A FUNCTION OF ALTITUDE, AND b) AEROSOL BACKSCATTER AND EXTINCTION COEFFICIENTS AS A FUNCTION OF ALTITUDE.

WEST COAST RESEARCH CORP ARMY
1527 26TH ST
SANTA MONICA, CA 90404
H M SPIVACK
TITLE:
ANALOG DIFFERENTIAL PRESSURE MEASUREMENT FOR VEHICLE DI
TOPIC: 71 OFFICE: TACOM

AN EXTENDED EFFORT IS PROPOSED TO ACHIEVE AN OPTIMUM DESIGN FOR AN ANALOG OUTPUT DIFFERENTIAL PRESSURE TRANSDUCER. THE TRANSDUCER IS

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INTENDED FOR INCORPORATION IN THE DIAGNOSTIC CONNECTOR ASSEMBLY VEHICLE MONITORING PROGRAM OF THE U.S. ARMY TANK COMMAND. RESEARCH IS TO BE PURSUED IN OPTIMIZING THE FINAL PRODUCT WITH REFERENCE TO MATERIALS OF CONSTRUCTION AND FABRICATION PROCESSES TO YIELD THE LOWEST COST FOR AN ACCURATE TRANSDUCER INTENDED FOR LONG SERVICE LIFE IN A FIELD VEHICLE ENVIRONMENT. CONTINUOUS ANALOG MEASUREMENT OF PRESSURE LOSSES IN INTERNAL COMBUSTION ENGINES AND HYDRAULIC COMPONENTS ADVANCES THE CAPABILITY FOR PREVENTIVE MAINTENANCE, TIMELY REPLACEMENT AND ENHANCED SERVICEABILITY OF MOBILE VEHICLES.

WINTEC INC AF
303 WASHINGTON AVE
VALPARAISO, FL 32580
CLAUDE M CONNELL
TITLE:
DIGITAL MISSION MANAGEMENT SYSTEM FOR ADVANCED DISPENSE WEAPONS
TOPIC: 189 OFFICE: AD/FXV

THE NEXT GENERATION OF STAND-OFF DISPENSER WEAPONS WILL DEPEND TO AN UNPRECEDENTED DEGREE ON A SOPHISTICATED SET OF WEAPON SUBSYSTEMS TO ENGAGE AND DESTROY DISTANT TARGETS WITH A HIGH PROBABILITY OF SUCCESS. SUCH FUCTIONS AS PROPULSION, NAVIGATION, FLIGHT CONTROL, GUIDANCE, PAYLOAD CONTROL AND TARGET ACQUISITION/ATTACK MUST BE PERFORMED ACCURATELY AND RELIABLY TO SATISFY STRINGENT MISSION REQUIREMENTS. THIS WILL REQUIRE AN ON-BOARD MISSION MANAGEMENT SYSTEM (MMS) WITH EXTENSIVE CAPABILITIES FOR SUBSYSTEM INTEGRATION AND MISSION CONTROL WHICH MUST ACCOMMODATE MULTIPLE PROCESSING AND INTER-SUBSYSTEM COMMUNICATIONS REQUIREMENTS. A FIRST SIGNIFICANT STEP TO DEFINE AN ARCHITECTURAL CONCEPT FOR THE MMS WAS INITIATED IN JULY 1985 UNDER A PROGRAM TITLED, DIGITAL MISSION MISSION MANAGEMENT SYSTEM FOR ADVANCED DISPENSER WEAPONS, AS A PHASE I SBIR CONTRACT AWARD. THIS PROPOSAL PRESENTS A PHASE II PROGRAM WHICH DEMONSTRATES THE VALIDITY OF THE MMS ARCHITECTURAL CONCEPT THROUGH APPLICATION TO AN EXISTING WEAPON SYSTEM IN A CASE STUDY AND THROUGH BREADBOARDING AND TESTING OF A CRITICAL ARCHITECTURAL ELEMENT. THE ULTIMATE OBJECTIVE IS TO PROVIDE GUIDELINES TO DESIGNERS FOR IMPLEMENTATION OF THE ARCHITECTURE.

XEMET INC NAVY
7525 BOBBYBOYAR AVE
CANOGA PARK, CA 91304
JOHN A ROBERTS
TITLE:
HIGH PERFORMANCE POROUS MATERIALS
TOPIC: [illegible] OFFICE: NAVSEA/NUSC

*A MODULAR APPROACH TO THE DESIGN OF A POROUS SURFACE CONSISTING OF AS

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MANY AS 43,776 CAPILLARIES PER SQUARE FOOT, FOR BOUNDARY LAYER CONTROL IS PROPOSED. THE ELEMENTS OF THE SURFACE COMPRISE UNIQUE STAINLESS STEEL CAPILLARY STRUCTURE INSERTS AND A RECEIVING SURFACE OF PERFORATED STAINLESS STEEL PLATE DESIGNED TO EXACTLY MATCH AND LOCK THE INSERTS IN PLACE. THE POROUS SURFACE IS STRONG, CORROSION RESISTANT AND LOW COST. FLEXIBILITY IN FLOW CHARACTERISTICS IS ACHIEVED BY CHOICE OF THE NUMBER, DIAMETER (0.0004 INCHES TO 0.200 INCHES) AND LENGTH (UP TO 100 TIMES L/D) OF THE CAPILLARIES IN THE INSERTS AND THE ARRANGEMENT OF THE INSERTS. THE SURFACE CAN BE CONTOURED WITHOUT CAPILLARY DISTORTION USING PROPRIETARY TECHNIQUES. THE CAPILLARY INSERT FABRICATION PROCESS IS UNIQUE AND IS SUCH THAT THE COST OF THE INSERTS IS RELATIVELY INSENSITIVE TO THE NUMBER OF CAPILLARIES PER INSERT, IN DIRECT CONTRADICTION TO CONVENTIONAL HOLE MAKING PROCESSES SUCH AS DRILLING, e.b. AND LASER TECHNIQUES.

ZEGER-ABRAMS INC ARMY
1112 CLARK RD
PHILADELPHIA, PA 19118
DR STEPHEN J ROSASCO
TITLE:
STEERABLE NULL CONTROL TECHNIQUES
TOPIC: 37 OFFICE: LABCOM/VAL

THE PROPOSED PHASE II EFFORT IS THE CONSTRUCTION OF BREADBOARD VERSIONS OF TWO TYPES OF MULTIPLEXED ADAPTIVE ARRAY PROCESSORS DESIGNED FOR THE ARMY'S MULTICHANNEL STEERABLE NULL ARRAY PROCESSOR (MSNAP) UNDER PHASE I. TEST AND EVALUATION OF THE BREADBOARD SYSTEMS WILL BE PERFORMED. BASED ON THE EXPERIMENTAL MEASUREMENTS OF PERFORMANCE, AS WELL AS ON PROJECTIONS OF ULTIMATE PRODUCTION COSTS, ONE OF THE TWO SYSTEMS WILL BE SELECTED FOR DEVELOPMENT AS AN ADVANCED DEVELOPMENT MODEL (ADM) UNDER PHASE III. IT IS FURTHER PROPOSED, AS AN OPTIONAL ADDITION TO THE PHASE II EFFORT, THAT A COMPANION ADAPTIVE INTERFERENCE CANCELER (AIC) BE DESIGNED AND CONSTRUCTED TO SOLVE THE MSNAP DUPLEXING PROBLEM, WITH SIMILAR MULTIPLEXING TECHNIQUES USED IN ITS DESIGN. AIC DEVELOPMENT UNDER PHASE II OFFERS A CONVENIENT OPPORTUNITY TO INVESTIGATE AN ALTERNATIVE SOLUTION TO THE DUPLEXING PROBLEM THAT MIGHT PROVE MORE EFFECTIVE OR MORE ECONOMICAL THAN FILTERING, PARTICULARLY WHEN USING A MULTIPLEXED IMPLEMENTATION.

bd SYSTEMS INC AF
357 VAN NESS WY - STE 110
TORRANCE, CA 90501
DR JOHN C BAKER
TITLE:
SURVIELLANCE INFORMATION CYCLE TIME AGAINST SMS/HML
TOPIC: 124 OFFICE: AFBMO/PMX

IN OUR PHASE I ANALYSIS WE STUDIED SURVEILLANCE INFORMATION CYCLE

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TIME FOR THE SOVIET'S CURRENT STABLE OF RECONNAISSANCE SYSTEMS AS WELL AS SOME MODESTLY ADVANCED SYSTEMS AGAINST REPRESENTATIVE SMS/HML DEPLOYMENTS. THROUGH THIS STUDY WE DETERMINED THAT THE REAL-TIME AND NEAR-REAL-TIME SYSTEMS ARE INDEED POTENTIAL THREATS TO THE SMS/HML. HOWEVER, THE EFFECTS OF CLOUDS AND TARGET PRIORITY CONFLICTS WERE NOT ADDRESSED IN PHASE I. SIMILARLY, PHASE I DID NOT DEVELOP GENERALLY APPLICABLE, USER-FRIENDLY COMPUTER TOOLS, NOR DID IT EXAMINE ALL OF THE POTENTIAL SURVEILLANCE TECHNIQUES: SYNTHETIC APERTURE RADARS, INFRARED SENSORS, AND CONUS-BASED OBSERVERS. THESE SHORTFALLS WILL BE REMEDIED IN OUR PHASE II EFFORT. THE CENTERPIECE OF THE ENDEAVOR WILL BE THE DEVELOPMENT OF A USER-FRIENDLY, MENU-DRIVEN COMPUTER PROGRAM FOR IBM COMPATIBLE COMPUTERS SUCH AS THE ZENITH 150. THIS PROGRAM WILL ALLOW THE RAPID AND ACCURATE ASSESSMENT OF SEVERAL DIFFERENT OVERHEAT THREATS TO SMS/HMLs IN DIFFERENT BASING MODES, WITH DIFFERENT TARGET PRIORITIES, AND IN VARIOUS SEASONS. WE ALSO WILL EXERCISE THIS CONVENIENT TOOL TO EXTEND OUR PHASE I RESULTS FOR THE LATEST BASING OPTIONS AND THREATS. WE WILL ALSO EXAMINE COUNTERMEASURES TO MITIGATE THESE THREATS AND ANALYZE THEIR EFFECTIVENESS.

BY FIRM

FISCAL YEAR 1985

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AL NUMBER OF AWARDS: 260

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Feb.

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